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NEWS
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Canada $2.75
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JUNE 1986 VOLUME 112, NUMBER 6

MODEL AIRPLANE NEWS

ON THE COVER: A fantastic shot of a great airplane, the F4U-7 Corsair, over the Santa Barbara Islands off the coast of California. This Corsair is owned and flown by John Shaftshausen and was used extensively in the TV series *Baa Baa Black Sheep*. Read Budd Davisson's fascinating story about this and other warbirds still prowling the skies in his story on page 40.

FEATURES

CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

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Editorial

by DAN SANTICH

ANYONE WHO HAS BEEN around aviation for a while, or was at Oshkosh for the annual fly-in, or lives in Denver, Colorado, has probably heard of Little Toot. It's the design of George Meyer, a stickler for detail, a master craftsman, and a real gentleman. George was proud of Little Toot; it set the standard by which all workmanship would be judged at Oshkosh, and following his untimely death, the EAA established the George W. Meyer Memorial Award, a very coveted prize indeed.

George's son Tommy, affectionately known as "Son of Toot," has seen to it that his father's work and dedication to aviation will not be forgotten. Not only does Tommy provide building packets and plans for Little Toot in full-scale, but he has initiated, through the JEFCO Aeromodelers Club of Denver, Colorado, the George W. Meyer Memorial Fly-In to be held at Chatfield State Park on July 5 and 6. Five events will be conducted: sport scale, giant-scale, sport scale flying, giant-scale flying, and craftmanship. This fly-in is special for many reasons, but the main reason is that men like George Meyer are special. They have left a legacy for all mankind to enjoy if they chose, asking only that their creations be known for what they are, as they are. Tommy has continued his father's tradition of excellence and we applaud him for it. In a few months we will feature a 1/3-scale version of Little Toot based on the drawings of the original. Don't miss this one.

By the way, Tommy's address is: Meyer Aircraft, 569 Tincup Terrace, Baily, CO 80421. Information on the contest can be obtained from: Bob Croft, Event Director, 8237 S. Lamar Ct., Littleton, CO 80123.

THIS MONTH. Jet Hangar Hobbies has a real nice kit in the F-86 Sabre and Ken Perkins does a masterful job of presenting it to you. This airplane does it all, and should dispel the fears some of us have about jet models. Ron Rodda has discovered that airbatic spelled backward is Citabria; something Balsa USA has known all along and their kit is a nice addition to their line. Talking about additions, the new Corsair by Byron Originals is a kit you'll surely want to add to your collection of warbirds. George Wendt gives you the lowdown on it and Budd Davisson gives you a pilot's-eye perspective of what it's like to fly the full-size versions, which complements his great cover shot this month.

DBS

Airwaves

Heath Baby Bullet

I'd like to find out who has the plans to your Heath Baby Bullet model. I remember that somebody was selling plans and I can't remember who it was. Hopefully you can help me. I'd like to build the Baby Bullet and sure would like to get a hold of your set of plans.

DICK WOLSEY
Reading, Massachusetts

The Baby Bullet plans (⅓ pure scale) should be available from Scale Plans & Photo Service, 3209 Madison Ave., Greensboro, NC 27403. DBS

Pro and Con

Warmest regards from Ohio! I could not be more pleased with your magazine. I have only one complaint—twelve issues a year isn't enough! Competing magazines have good issues, so-so issues, and just plain lousy issues—yours are consistently excellent and Budd Davisson's articles are the frosting on the cake....

ART SCHMITZ
Vermilion, Ohio

I feel I must complain about the current content of your once excellent magazine. I purchase *Model Airplane News* for what its title tells me—news about model airplanes! As excellent as Budd Davisson's articles on full-size aircraft are, they *do not belong* in a magazine that caters to aeromodelers. If I want to read about full-size aircraft, I will purchase a magazine on that subject....

BRUCE ABELL
New South Wales, Australia

Letter to the Editor

In reading your "Contact" column in September 1985, I couldn't help but feel that you were talking directly to me. I've taken a 25-year sabbatical to raise a family, etc., and now I'm back but find I need help. We have only one hobby shop in this area and it is more like an adult toy store.

I want to buy a "one-and-only" radio transmitter that will cover receivers from 2- to 7-channels if possible.

The choices of AM and FM, manufacturers, the multitude of "house brands" built by them, and the prices that are like yo-yos are mind-boggling for a peanut tube and escapement guy like me.

Please help!

DON CLARK
Portland, Oregon

This letter could have been written by a thousand and more such modelers who have come back to the hobby after a period of absence, only to find themselves lost in a quagmire, confused over the multitude of high-tech products, the application of which is like looking into a kaleidoscope, ever turning and changing.

In the near future I plan to initiate a series of articles directed at these modelers, lost in a time warp where the hobby they knew is not the hobby that is.

For the time being, however, the best advice I can give you is to seek out other modelers in your area. The best source of information about them can usually be found at a local hobby shop. If they have no information, write to the Academy of Model Aeronautics, 1810 Samuel Morse Dr., Reston, VA 22090. They can provide names and clubs in your state and area. DBS

Editor's Flight-Line Review

by DAN SANTICH

Each month model products will be reviewed personally by the editor. This will be a "hands on" evaluation whenever possible and these products will receive close scrutiny under actual operating conditions. These reviews do not constitute any recommended priority over an existing product of similar design or nature, but merely reflect the use of available items from your dealer or hobby shop.

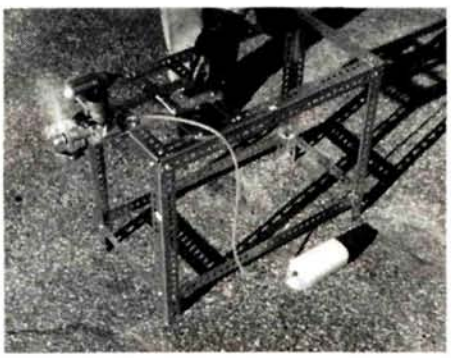
PERRY REGULATED PUMP

One of the biggest problems confronting us from powered models is fuel flow to the engine. It's a fact that the carburetors on most model engines are designed to receive constant fuel pressure, yet, because of their utter simplicity, they have no way to deal with the changes in flight attitude or G forces that our models constantly undergo. Add to that the problem of fuel tank location and the fuel pickup location in the tank, and you can see that this is the number one problem in achieving consistent engine runs.

The common solution to this problem is to set the needle on the engine a bit on the rich side. As the fuel level in the tank decreases, and about halfway through the flight, the engine finally comes "in" and we get a few minutes of peak performance. If we get carried away, however, we may just ruin our engine when the fuel level in the tank gets below half. This is because we are now making the engine run harder and hotter because of the decrease in fuel pressure within the tank. More engines have been "cooked," and even ruined, because of this fuel pressure differential.

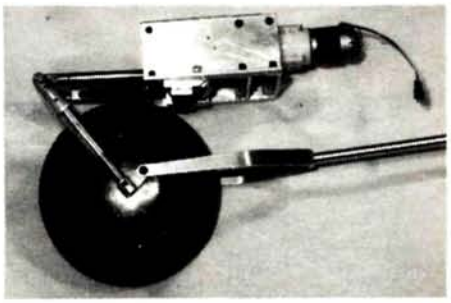
John Perry of Perry Aeromotive (1568 Osage St., San Marcus, CA 92069) has been aware of this downfall in our model engines for a long, long time. His solution was to come up with a pump that operates off of the crankcase pressure of the engine. Since the internal pressure of an engine is constantly changing, a regulator is built into the pump which converts the nominal high and low internal psi to a regulated .25 psi output that then goes to the carburetor. Regardless of the fuel tank location, the attitude of your airplane, or the G forces that the tank is being subjected to, the fuel flow to your carburetor will remain constant.

I tested this new pump with an HB .61 Blitz on a test stand. As you can see, I used 3 feet of fuel line and I positioned the fuel tank anywhere the 3 feet would allow. No matter where I set the needle, the rpm would remain at exactly that setting, regardless of the position of the fuel tank. In the air it's the same thing. Once the needle is set where you want it, it will stay there throughout the entire flight.



This pump can also increase the performance of your engine by allowing you to use a larger carburetor than you could before when your engine was running on suction alone. The pump comes in two versions, one for methanol-based fuel (which has a red top) and one for gasoline and diesel (which has a black top).

Installation of the pump is quite simple, but it should be mounted as close to the engine as possible, and on the same level as the carb for best performance. As with all fuel systems, a fuel filter should always be used between the pump and the tank.



THE LIKES LINE

Pictured here is one of a set of custom-built, retractable landing gear for the Nick Ziroli DC-3. When built to plans, this airplane uses two gasoline engines and weighs 55 pounds. To support this kind of weight, the gear must be healthy. Believe me, the Likes Line (46 Cory Dr., Tom's River, NJ 08753; 201-244-6377) retracts are.

Made from steel, brass, and aluminum, each unit is mounted in a metal box with pivots supported by bronze inserts. The drive system is very positive and is driven electrically by a worm screw rotating through a brass-threaded shoulder. This is a good feature because the gear will not sag out of position and the up and down locks are very strong, which prevents folding on a hard landing. They are also sprung with shock-absorbing action.

The system operates from a .5-amp, 12-V DC nickel-cadmium battery that is activated by a microswitch hooked up to your retract servo. Over 50 cycles can be achieved on one charge of the battery, which gives plenty of drive power for the gear under extreme conditions.

Hank Likes also makes custom gears for most all other types of giant-scale models, such as the P-51, P-47, P-40, F4U, T-6, and others. Give them a try. I think you'll "like" them. ■

Basics of Radio Control

ADHESIVES

by RANDY RANDOLPH

LET'S TALK about glue and the different kinds of it that are available for our use. We need glue because the best materials and wood in the world are of little use to us unless we have some way of holding the pieces together. The first kind of glue that always comes to mind when I think about model airplanes is, of course, model airplane glue.

These glues or cements are made with solvents that evaporate quickly, such as acetone, and they rely on the evaporation of these solvents to cure. This was the only type of glue that was really useful for a number of years until the advent of the glow engine with its alcohol-based fuel. Alcohol will dissolve model airplane cement and acetone.

Even though alcohol is the most prevalent fuel in use today, that doesn't mean that model airplane cement (Ambroid, Testers, etc.) should be ignored; far from it! These are still some of the lightest glues available and will hold well for years. They're excellent for all balsa structures that will be protected from engine exhaust by paint or covering materials, such as the plastic films.

The best way to obtain a good joint with this glue is by applying a small amount to both pieces to be glued, allowing them to dry, then adding more glue, and joining. This method gives the wood a chance to soak up some of the glue. There are model airplanes built over 40 years ago with this type of glue that are still flying. It definitely has a place in every modeler's workshop.

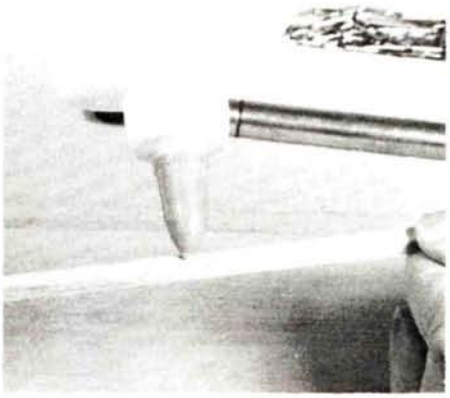
When it became obvious that glow fuel was dissolving glue joints, modelers first turned to "hot fuel proofing" which amounted to painting a clear finish that was impervious to fuel over the entire airplane. Later this practice gave way to finishes and glues that were already fuelproof. Enter the white glues.

White glues, such as Elmers, are generally unaffected by alcohol and are water-resistant. It's interesting to note that "water-resistant" is different from "waterproof." To be waterproof, it's necessary for the glue joint to withstand boiling for a period of time as opposed to merely soaking. To get a really good joint with the white glues, the pieces to be glued should be clamped, but for our purpose, white glues can be treated the same as model airplane cement without the double application. They do require a longer drying time and are heavier.

Aliphatic resin or yellow glues are an improvement over the white glues, not only in strength, but in the way they react to sanding. White glues tend to ball up when sanded, even after they're well cured, but the aliphatic glues sand very well. Neither white nor aliphatic glues require spreading the glue on both surfaces before they are joined, but it is a good practice.

These glues work well for gluing balsa to balsa and plywood to balsa, such as attaching plywood doublers to balsa fuselage sides. When large areas are to be spread with glue and joined, it's a good idea to dampen the opposite sides with water to eliminate any warping that might happen because the glue side of the balsa, being damp, tends to swell.

These glues are the very best for gluing balsa to foam because they don't attack foam as do most other types. Another good feature is the fact that they are water-based and can be readily cleaned up with water before they cure.



Aliphatic resin glue comes in easy-to-use squeeze bottles.

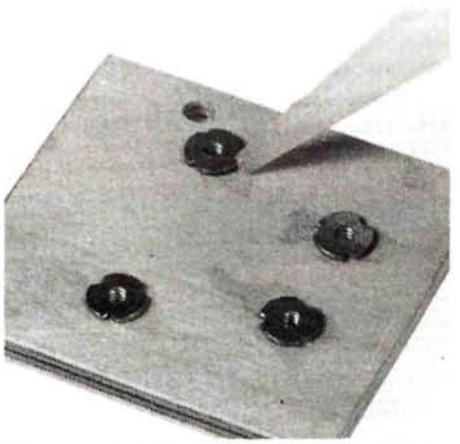
So far I've discussed types of glue that cure in the air but all glues don't need air to dry or cure: they do it by chemical action. These are the epoxies and the cyanoacrylates.

Epoxies are two-part glues, and the two parts must be mixed together before they can be used. They are available with different curing times so they can be used for a number of jobs. For instance, the rapid-cure types are good for field repairs and the slow-curing kind can be used when it's necessary to spread glue over large surfaces and for glue jobs that

Essential tools for the modeler are these different types of adhesives described in text.

might require changes in alignment prior to final assembly.

Epoxies were the first truly quick-curing glues, with set times as fast as one minute or less. For general model assembly, the 30- to 60-minute types are best. The "pot" life of these glues is somewhat less than the cure time, so mix a new batch when it starts to thicken. In warm weather, epoxies cure more quickly than when it's cold so it's possible to hasten the cure with the application of heat from a heat gun. Heat makes them thinner as well as speeds up the cure time. Epoxies are quite a bit heavier than other types of glue because there is no evaporation or shrinking. These are the glues to use for mounting firewalls and in areas where the accumulation of oil or fuel could be a problem.



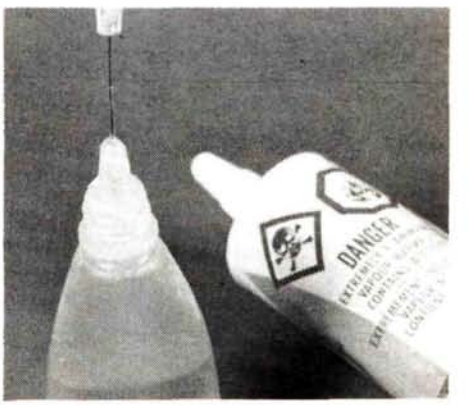
Cyanoacrylate glue is great due to its wicking abilities, as under T-nuts on a firewall.

Cyanoacrylate glues have revolutionized the modeling hobby. These glues (Hot-Stuff, Jet, etc.) can be obtained in cure times that vary from an instant to several minutes, so they can be used in almost any application you might require. These products have reduced to zero the building time spent in "waiting for the glue to dry."

To use the thin, instant-curing variety of cyanoacrylates, you must have all the pieces to be joined in place and in good contact with each other, then apply the glue and allow it to wick into the joint. For a good bond, it's important that solid wood-to-wood joints be made. The glue will not fill in voids unless they're filled with baking soda or sawdust before you wick the glue into the joint.

The thicker, slower-acting cyanoacrylates (Super Jet, Super-T, etc.) will fill gaps. In fact, when used in conjunction with one of the accelerators, fillets can be built up around a joint by alternating between glue and the accelerator. With the exception of gluing foam, the thick cyanoacrylates can be used as a substitute for the other types of glue.

There are some disadvantages to the cyanoacrylates: they are heavy if overly applied and they cause allergic reactions in some people. They will bond human skin almost instantly, so take care to get the glue on the joint and not on yourself. Fortunately, debonders are available that remove glue from skin and other things.

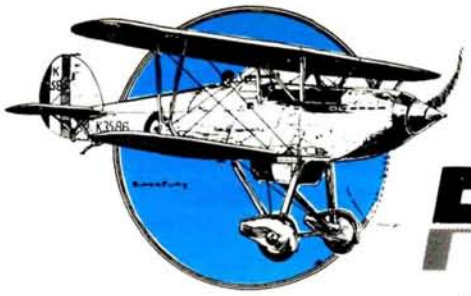


The old standby, Ambroid model cement, can be thinned with acetone and applied in tight places with a hypodermic needle.

There are areas in which a specific glue seems to work better than others and as you gain building experience, you'll probably settle on one or two types that fill your needs. Some of us enjoy building and are in no rush for the job to be completed, while others build only to have a finished model as soon as possible. There is a glue for both ends of the spectrum.

Next month—sandpaper. (It's nearly as important as glue!)

Randy Randolph, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■



Fifty Years Ago...

by DAN SANTICH

IN 1936 THE SKIES were filled with a mixture of biplanes, monoplanes, seaplanes, and racers. Most people had never been in an airplane until the DC-3 forever changed the way we would look at air travel. Although passenger aircraft were not new, the prospect of making money by carrying passengers was only a dream for many airlines until the DC-3. But it was the DC-2 that proved the feasibility.

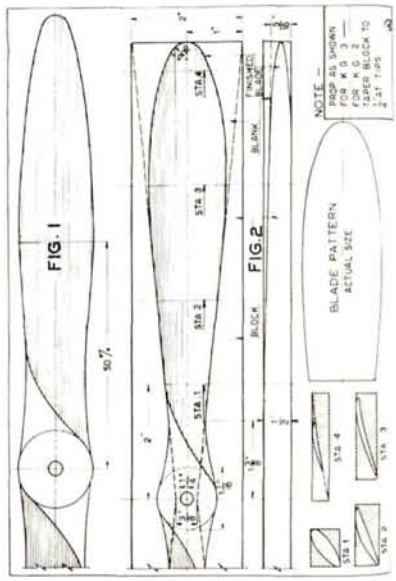
Civil aviation abounded with companies looking for a market. Beechcraft introduced the C17R, B, and L models of a biplane that became known as the Staggerwing. Lockheed was getting serious about passenger travel and introduced their Electra Model 10A, a 10-passenger, twin-engine airplane that was capable of nearly 200 mph. North American Aviation introduced a new general-purpose, tandem-seat military airplane designated NA-16 G.P. that gave birth to the famous Texan T-6. Seversky Aircraft was building several different single- and two-place monoplanes toward military application, and Taylor Aircraft Company rolled out a small, two-place, fabric-covered airplane known as the New Cub.

Modeling was getting a big boost from the increasing availability of gasoline engines, and more and more contests were being conducted for airplanes powered by these new jewels. Now offered were the Baby Cyclone, G.H.Q., Fergusson, Gwin Aero, Brown Jr., Tlush Super Ace, and Forster. Kits for these engines were also coming to be. The makers of the Baby Cyclone engine also offered a kit called the California Chief with a 5-foot wingspan. G.H.Q. Model Airplane Company introduced their Loutrel Sportster and Bunch had a kit for $12 to go along with their engine. The design was called the Scordion Major and had a wingspan of 57 inches. Propellers for these engines were hard to come by so Joe Kovel authored a feature article in the June 1936 issue of *Model Airplane News* on how to make your own.

In a letter to the editor in the same issue, Lamar Jackson of Turlock, California, noted: "I realize that the biggest factor in the development of interest in gas jobs is the prohibitive costs, and the only thing that will make it really become the sport of young and old is for the manufacturers of engines and wheels to cut down on their prices and for the designers to instruct builders in the art of making something out of nothing."

At that time the most expensive engine and kit combination cost $35. An ad appeared in this issue that proclaimed "Finished Boeing Radio Control" that was a ready-to-fly model and sold for $3.25. Was this the first true radio-control, ARF kit?

Modeling was fun in June 1936, just as it is today, and *Model Airplane News* was there to tell you about it, fifty years ago. ■



Since props for gas engines were not yet available, M.A.N. told you how to make them.

In 1936 you could buy a Baby Cyclone, a kit, and a prop for $21.50.

The Lockheed Electra was a 10-passenger twin capable of close to 200 mph.

Surface Detail

by DAN SANTICH

A simple approach for that true scale look.

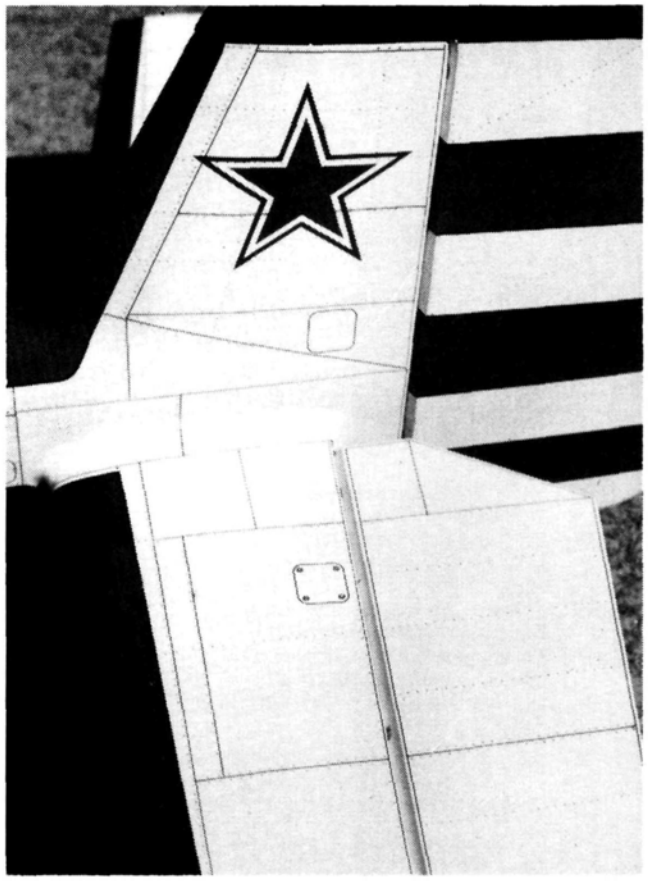
SURFACE DETAIL FOUND ON full-scale aircraft can be a real chore to duplicate on a model. Most modelers would probably rather forget such little items as rivets, panels, fasteners, fuel caps, doors, handles, lights, hatches, and the like. If your pride and joy is for contests, however, where these things require a three-dimensional effect, there is little alternative than actually doing them. It's often said by scale purists that building the model is easy; it's the detailing that's the difficult part.

There is no doubt that a well-detailed model will be a standout at any gathering. It shows a great dedication on the part of the modeler and his efforts are often rewarded with the "Best of Show" award at the many static shows held each year. The reason these models are always on top is obvious—they represent a closer degree of realism than a model that is simply covered.

Years ago, when control-line stunt competitions began giving points for beauty, builders soon recognized the advantage of surface detail. But would the same type of reward be given to a model that only had detail drawn on with an ink pen? The answer to that was "yes." Since that time, some of the most beautiful models have come out of the workshops of control-line stunt enthusiasts.

This type of detailing was picked up by the Formula I Pylon enthusiasts and they soon had some of the most beautiful creations in modeling. Not only were the panels, rivets, fasteners, etc., drawn on their models with pen and ink, they were colorfully decorated, shaded, and toned with art-style air-brushing, a technique that is quite popular on customized automobiles, boats, and racing planes. The best thing about this type of detailing is that it's relatively simple and quick to do. The results will amaze you.

The best source of information for detailing the surface on any model can be found on any high-quality plastic model. All the rivets, panels, etc., are already laid out.



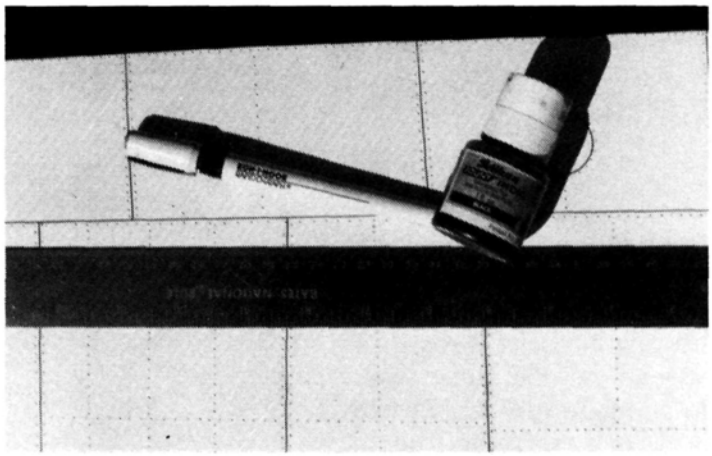
Above: Very easy to do once the technique is mastered, application of panel lines and rivets adds a nice touch.

Obviously, you don't have to copy them all, but the more you do, the better your model will look. And the best thing is that you can do it to any model you choose, be it a trainer, sport model, pattern ship, or whatever. It doesn't have to be scale. For example, a Sig Kougar painted up in Thunderbird markings is a dynamite looking model, as is a Midwest Stik, a Top Flite Contender, or any other sport model. The idea is to give it something that will bridge the gap between model airplane identity and the full-size bird.

It takes very few tools to do a non-dimensional detailing job. In fact you can use an inexpensive fine-tip felt pen if you like. Once it's put on, remember to seal the ink with clear paint.

For the job shown in the photographs, I used a draftsmen's automatic drawing pen, which is available at most art stores for around $10. India ink seems to work best, as it's color constant, dries quickly, and doesn't smudge easily. If you mess up and want to do something over, wipe it with a wet cloth and you have a fresh surface on which to start over.

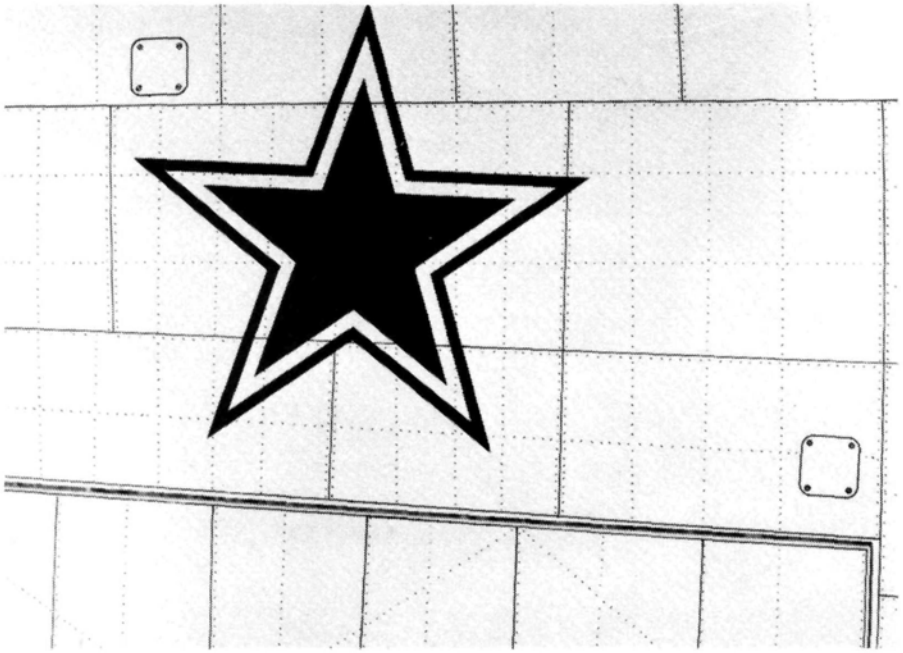
Right: Tools required are a drafting pen, India ink, and a straightedge.



Above: Author's Yak 55 from the Meterhausen kit from West Germany is red, white, and blue.

I've used this method of detailing on painted models and also models with heat-shrink covering. Obviously, the shrink-type material will distort the lines if you apply heat after you have your lines on. Covering fabrics, such as Coverite, also take the ink well, and a coat of clear enamel on top will really set the model off. Naturally, if the model uses a glow engine, make sure the clear paint is fuel-proof.

It's surprisingly easy to have a really nice looking model with this surface detailing method. Give it a try. ■



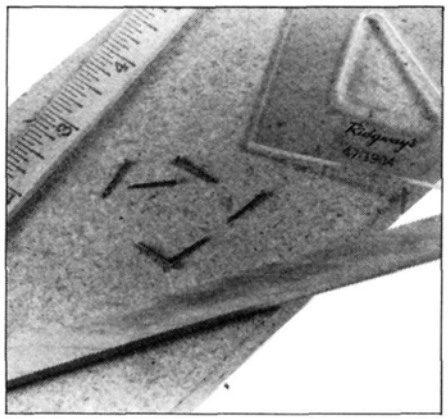
Left: After panel lines, rivets, etc., are applied, a coat of clear polyurethane for protection is sprayed on.

How To:

by RANDY RANDOLPH

MAKE A SPAR WEB JIG

Most built-up wings call for an I-beam-type spar; that is, a top and bottom spar joined by vertical grain balsa webs between the ribs. These webs can be made very rapidly with the aid of a simple jig. The photos show the way.



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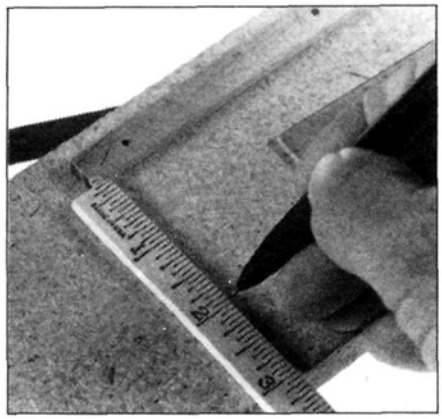
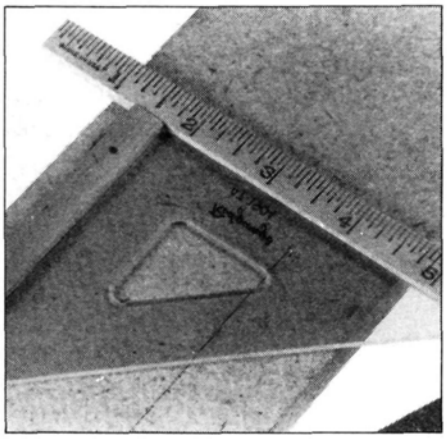


2.

1. The materials needed are a piece of ½-inch particle board that is 5 or 6 inches wide and a foot long, a 12-inch length of ⅛x¼ inch hardwood, some brads or tacks, a ruler, and a right triangle.

2. Tack a 4-inch strip of hardwood parallel to one side of the board near the center. Measure down from this strip the same distance as the rib spacing on the wing, less the thickness of the rib, and mark. In this case, 2 inches less 1/16 inch equals 1 15/16 inches.



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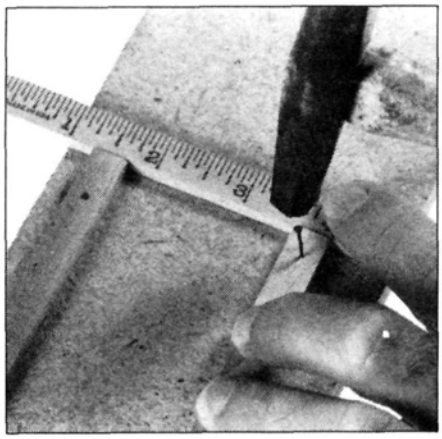
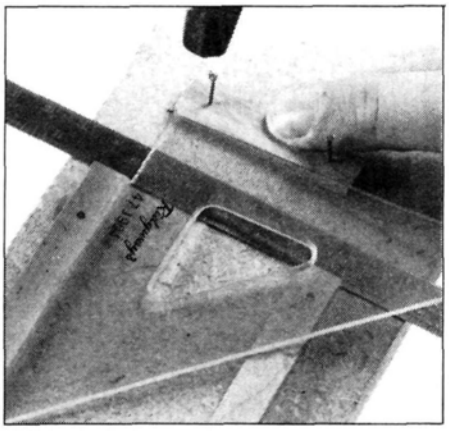


4.

3. Place a right triangle against the strip and hold a ruler flush against the right edge of the strip and at a right angle to fit it and...

4. ...tack a second strip, flush with the edge of the ruler, the measured distance from, and parallel to, the first strip. The two edges of the strips must be at right angles to each other.



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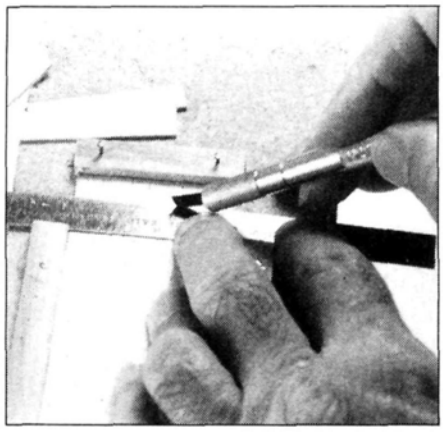


6.

5. Place a metal straightedge across the ends of the two strips and measure from its outside edge the width of the desired web. Use the right triangle as a guide and tack a 2-inch strip of hardwood at this location as a stop.

6. Cut the webs with a razor knife along the edge of the metal straightedge. Slice the sheet stock to correspond to the distance between the two guide strips. Hold the straightedge firmly against the guide ends and the cuts will be true. Note the grain!

Construction

New Wave

by GORDON JACK

An eye appealing approach to pattern with performance to match.

THE NEW WAVE WAS ORIGINALLY DESIGNED to fill the gap between the all-out pattern and semi-scale type Turnaround aircraft. I soon found the primary interest in this aircraft, however, to be from the sport flier. I've met many fliers who like the idea of an original pattern airplane that looks and, with an FS 120 mill up front, sounds scale.

It all started in the spring of 1984 when I was working on some sketches of a new Turnaround pattern airplane for the O.S. 120 four-stroke single. Finding an outline with eye appeal and pattern plane dimensions, and one that could still

SPECIFICATIONS

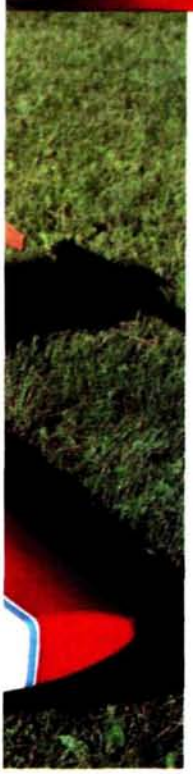
Type: *Sport/Pattern*
Wingspan: *72½ inches*
Wing Area: *960 square in*
Weight: *8.75-9.75 pounds*
Engine: *120 four-stroke*
Channels: *4*

allow for the cowling in of that big motor was a problem. Since I was trying to avoid the inverted motor setup, a narrow fuselage concept didn't allow this to be easily accomplished. Lasers, CAP 21s, and Dalotels did allow for a horizontally-mounted, cowled engine, but I was still looking for something just a little different.

Working from sketches, I built a fuselage mockup and was able to achieve a canopy shape that I was satisfied with. The airplane still needed a cowl. This is where Jim Drummond, a very prominent glider flier in my area, came into the picture. Jim is very talented at carving a finished product from a block of wood.

Using only the fuselage mockup and the dimensions of a 120 with a 2½-inch spinner, he started to carve. A week later he had the cowl plug finished. It was made in two parts, top and bottom, as it was almost impossible to slide a cowl on and off past that big engine, and it looked great.

With the cowl ready to mold, I decided to mold the canopy from fiberglass as well, for simplicity's sake. After all, this airplane is a sport/pattern type, and is not scale, so why go to all the trouble?



The original model was heavy, with its foam core wing, stab, and vertical stabilizer. Finished with epoxy paint, it weighed in at 10¾ pounds. This, combined with a leading edge radius that was too sharp, resulted in some pretty hairy square corners and unsatisfactory vertical performance.

I then added new built-up and MonoKoted wings. Moving the center of lift forward 5% and increasing the radius of the leading edge eliminated the snappiness, but only shaved about ½ pound off the total weight, and the vertical performance still suffered.

It was time to start on a new, entirely built-up airplane. I shortened the nose 1 inch to allow for the anticipated CG shift, and decided to go with an all MonoKote finish. I also decided to go to a removable stab section for ease of transportation. This time the airplane came out at a very pleasing 9¼ pounds.

On the first flight of the new and lighter New Wave, the airplane left the ground like it was launched from a catapault; less than 50 feet on a grass strip. It felt very predictable and stable. At this point I would love to tell you that I did a 1½ snap and proceeded to climb out inverted. The first flight, however, incorporated only testing of stall and landing approach speeds. On subsequent flights I trimmed CG, tracking, and wing balance, one at a time of course. I also recommend the use of two elevator horns via a Y-type pushrod. I have seen too many well-built airplanes that are almost untrimmable because the elevators are ever so slightly out of alignment.

Air drag on a larger type pattern plane causes the joining wire to flex, so even elevators that are very accurately aligned will twist out of alignment under load.

I reduced the incidence from +1° to ½° to help eliminate the inside pull during knife-edge flight. After more trimming, this characteristic seemed to improve.

Enough of all this hangar talk, let's get down to building.

CONSTRUCTION. To start building, select good wood; about four sheets of ⅛x4 soft sheet for sheeting the top decks, a medium-hard stock for the main wing spars, and a light-medium for the rest.

I find it easiest to cut out all the parts and make a kit. This airplane is very basic and goes together quickly, and

having all the parts cut out keeps the assembly going along very smoothly. I dislike carving blocks so you'll notice the block work has been kept to a minimum.

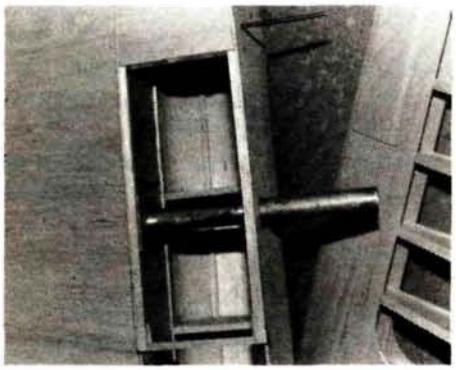
Start with the wings. Draw a centerline on the leading edge stock and block the leading edge so the center is 1⅛ inches off the bench. Block the bottom ¼-inch square trailing edge spar, so the bottom is 11/16 inch off the bench at the root rib W1 and ¾ inch at the tip.

The main spar should be touching the bench at the root and blocked up 5/16 inch at the tip. Glue all the ribs in place,

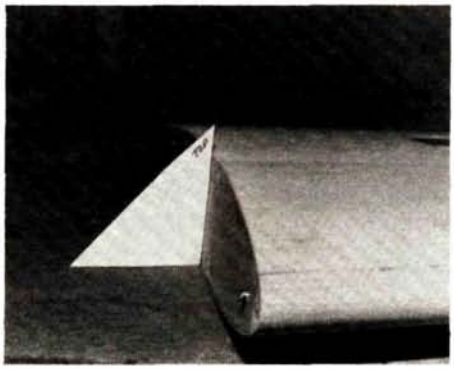
then glue the top ¼ inch trailing edge spar and top main spar in place. The 1/16-inch leading edge sheeting supports are not mandatory; they're only there to prevent the sheeting from sagging. Sheet and capstrip only the bottom of the wing at this time. Don't skin the top as you'll need access to the inside of the top of the wing for the wing joining tube and the wire alignment tubing. Once both wings are completed and the bottoms are sheeted, set them aside.

Cut out the fuselage sides from good ⅛-inch medium stock. The fuselage sides should be spliced toward the rear and at a 45° angle to ensure a strong joint.

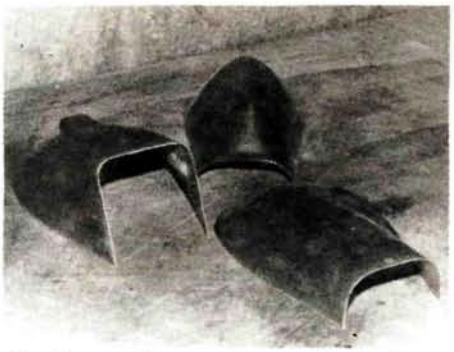
Glue the ¼-inch square to the fuselage with a slow cyanoacrylate adhesive. Using the same glue, glue the ⅛-inch vertical grain doublers in place. Note F1, F4, and the landing gear block are glued directly to the fuselage side and not the doubler. Some ⅛-inch lite ply can be substituted for the doubler, but watch for the weight buildup.



Use of aluminum tube for spars gives plenty of radio room.



Check alignment of butt rib as shown.

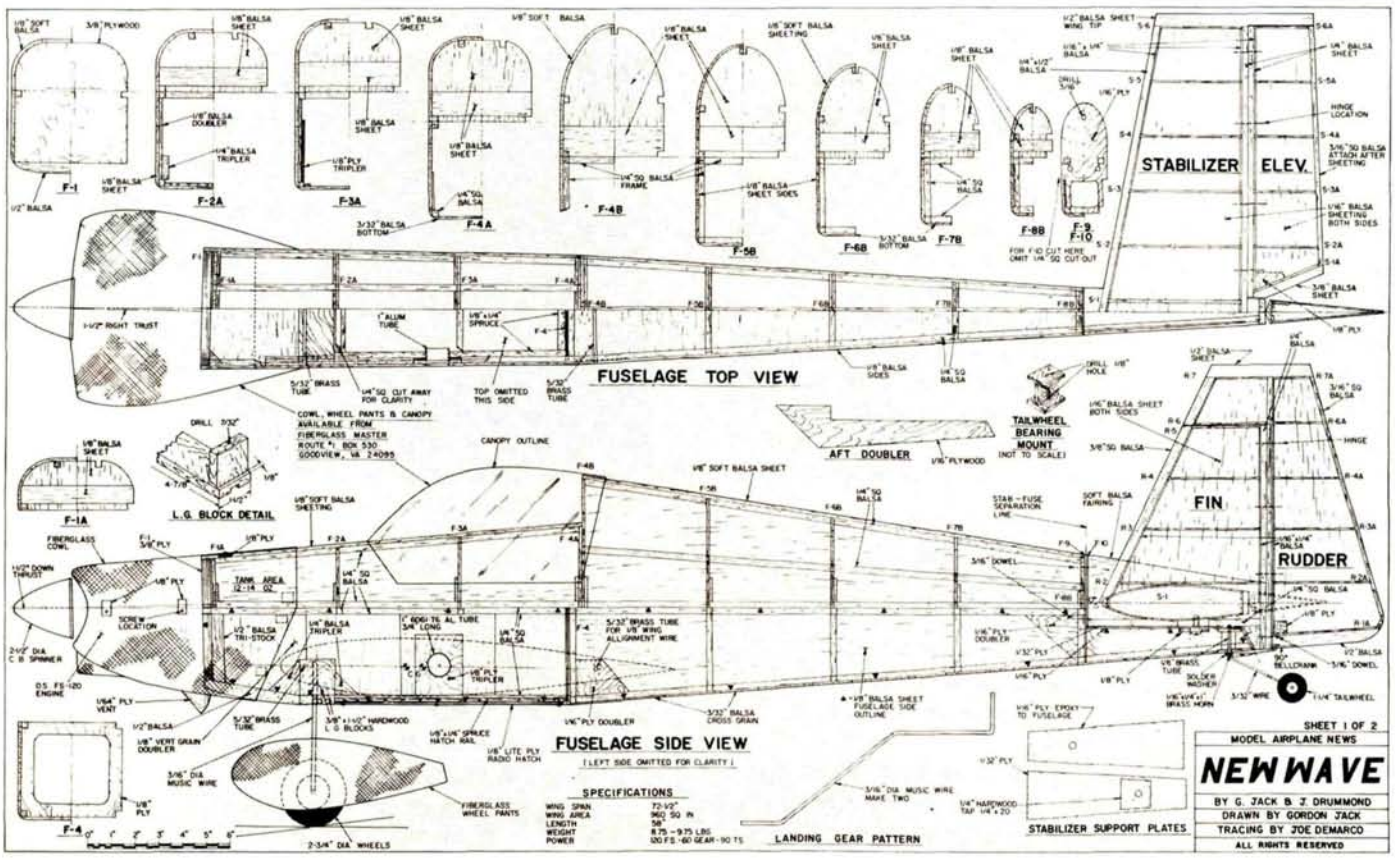


Cowling and canopy are available from author and Fiberglass Master.

To frame up the lower fuselage, use a slow-curing epoxy and glue F-1, the landing gear block, and F4 in place with the fuselage upside down, and F1 hanging over the edge of the bench. Note: F1 has the thrust line built in and should be double-checked before leaving it to cure. If you've made an error in gluing F1 in place, don't panic; the thrust angles can be corrected with the radial mount.

Pull the rear fuselage sides together, making sure the ¼-inch square cross members are cut accurately. Make sure the centerline follows the center of the fuselage. You can now sheet the bottom of the fuselage.

Draw a line on the fuselage sides ⅛ inch below the center of the tubing hole.



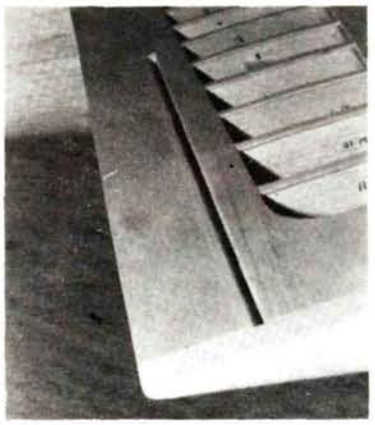
To achieve the +½°, the leading edge of the line should be 5/32 inch above the trailing edge. Drill the 5/32-inch hole in the fuselage sides for the wing alignment tube. Glue in the 5/32-inch brass tubing to the fuselage.

With the fuselage square to the bench resting on the bottom, glue the 1x¾-inch tubing in place using the wing joining tube to align. Make sure the tubing is 90° to the centerline of the fuselage and both ends are the same distance from the bench.

Place the 1x1-inch tubing in W1 and W3, and slide the wing in place. The dihedral should be 1½ inches at the tip as compared to the root. This measurement is taken under the main spar location.

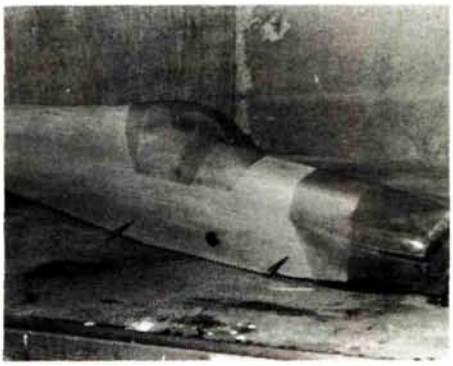
Align the wing accurately to the incidence angle drawn on the fuselage side. Tack-glue or pin in place. Using a piece of ⅛-inch wire sharpened on one end, push through the fuselage brass tube and mark the wing for the 5/32-inch holes. Remove the wing and accurately drill the hole. Slide the wing back on and, using the same wire, mark the location for the 5/32-inch hole in W2. Remove the wing once more and accurately drill the 5/32-inch hole in W2. Place the 5/32-inch brass tube in the wing and slide the wing back on. Push the ⅛-inch wire through and when you're satisfied that everything is aligned just right, glue the brass tubing and the 1-inch aluminum tubing in place. Remember to use a scrap piece of ply to cap the ends of the brass tube and the aluminum tubing at W3. Remove the wing, and place and glue the ¼-inch balsa doublers to W1 and W3. Repeat for the other wing.

(Continued on page 95)

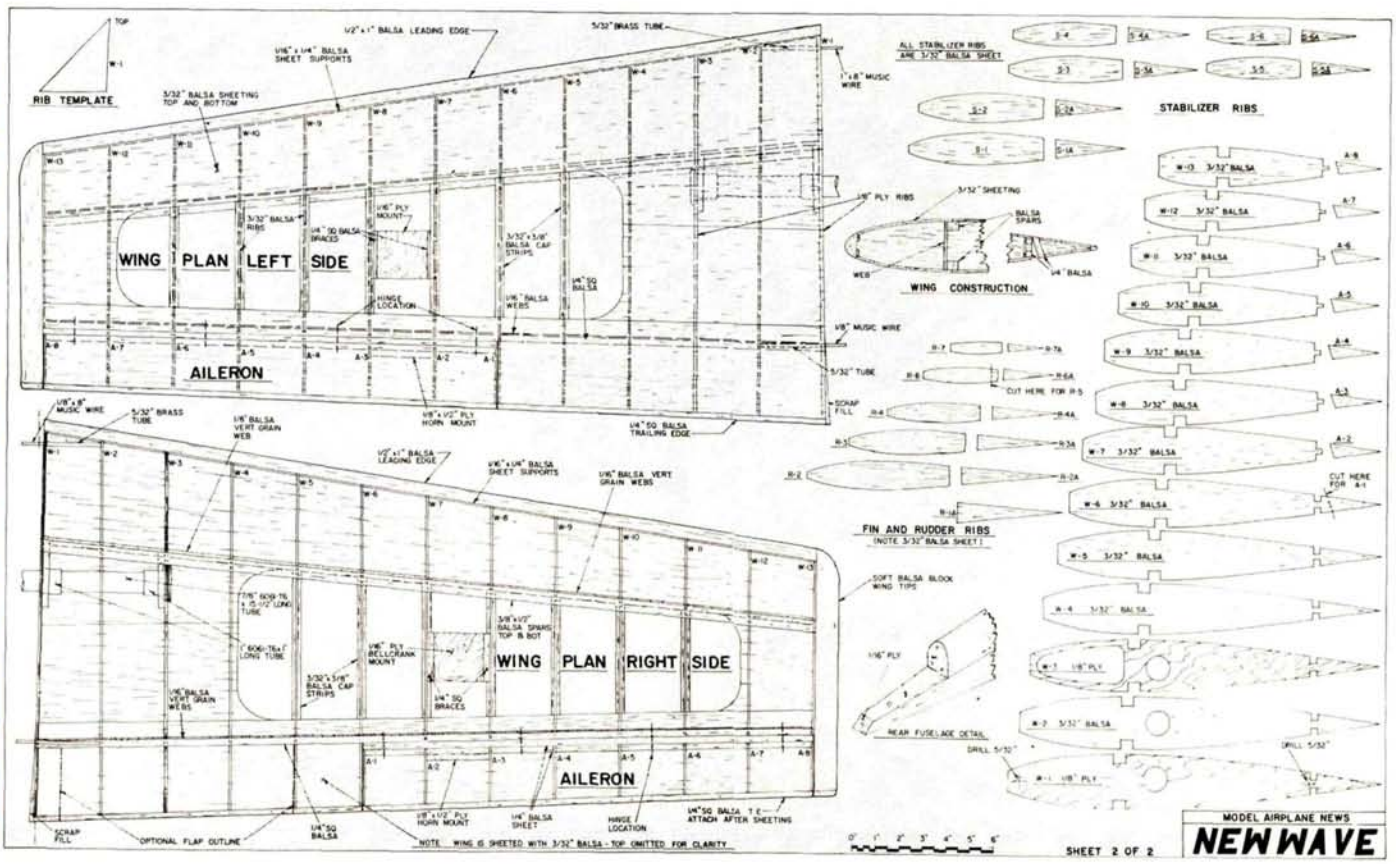


Bottom view of wing shows aileron gap.

Butt rib of wing panel shows guide holes and alignment pin receptacles.



Completed fuselage ready for your favorite paint scheme.



FULL-SIZE PLANS AVAILABLE...PAGES 124, 125

Control Tower

by CHARLIE KENNEY

Handsome transmitter, Futaba G Series gimbals and electronic trim functions.

THIS MONTH IT'S back to business as usual as I have another brand new radio to review, the Futaba* Conquest FP-4NL four-channel system operating on channel 50, 72.90 MHz (green-black). Featuring the Futaba competition G-series type adjustable open gimbal sticks, the new four-channel system gives that degree of precision found only in considerably more expensive Futaba sets. Available in both a six-channel and a four-channel version (see March 1986 *M.A.N.* for the six-channel Conquest review), the system is fully nickel-cadmium battery equipped. In addition, the four-channel Conquest has a triple tuned receiver and two choices of servos, the S28 or the S33.

As you open the styrofoam case and view all the neatly packaged goodies, the transmitter really jumps out at you. Constructed with gray plastic and brushed aluminum panels, the stick bezels literally sparkle and the output meter commands your attention, large and easy to read.

Let me highlight some of the features of the system, then I'll discuss them in more detail. The Futaba FP-4NL system I received included the FP-T4NL transmitter, the FP-R4F receiver, three FP-S28 servos, an NR-4M airborne battery pack, an SWH-1 switch harness, and accessories consisting of servo mounting trays and hardware, frequency flag, FBC-8B (1) charger, and extra horns.

TRANSMITTER FP-T4NL

- Reliability substantially improved by use of automatic insertion equipment to assemble the PC board.
- Servo-reversing switch for each of the four channels.
- Newly designed G-series type open gimbal sticks operate smoothly and positively. Spring tension adjustment of the stick allows for the optimum operating feel.
- Non-slip adjustable stick head allows adjustment of the stick length as desired (maximum ¼ inch).
- Transmitter has RF and encoder PC board module style system.
- Case is functional, easy to handle, and has a good feel.
- Square transmitter battery voltage/output level meter is easy to read.
- Good radiation efficiency and husky 8-section, 37-inch long telescoping antenna.
- Transmitter can be hung from your neck using the neck strap provided.
- Transmitter built-in nickel-cadmium battery provided.

RECEIVER FP-R4F

- A compact, lightweight, rugged four-channel receiver.
- Newly designed AGC circuit minimizes interference.
- Fiberglass-reinforced epoxy resin PC board with through-the-hole plating improves vibration and shock resistance.
- Three-wire gold-plated mini block connector is compatible with all Futaba servos.
- Rugged case is fiberglass reinforced.

SERVO FP-S28

- Skew-type armature motor. Movement of a trim control by even one click is tracked by a skew-type motor which displays a performance near that of a coreless motor.
- New indirect drive potentiometer improves vibration and shock resistance and neutral accuracy.
- Futaba low-power custom IC provides extremely high torque, narrow dead band, and superior tracking.
- Fiberglass reinforced PBT (polybutylene terephthalate) injection-molded servo case is mechanically strong and invulnerable to glow fuel.
- Strong polyacetal resin ultra-precision servo gear features smooth operation, positive neutral, and very little backlash.
- Fiberglass reinforced epoxy resin PC board with through-the-hole plating improves servo amp vibration and shock resistance.

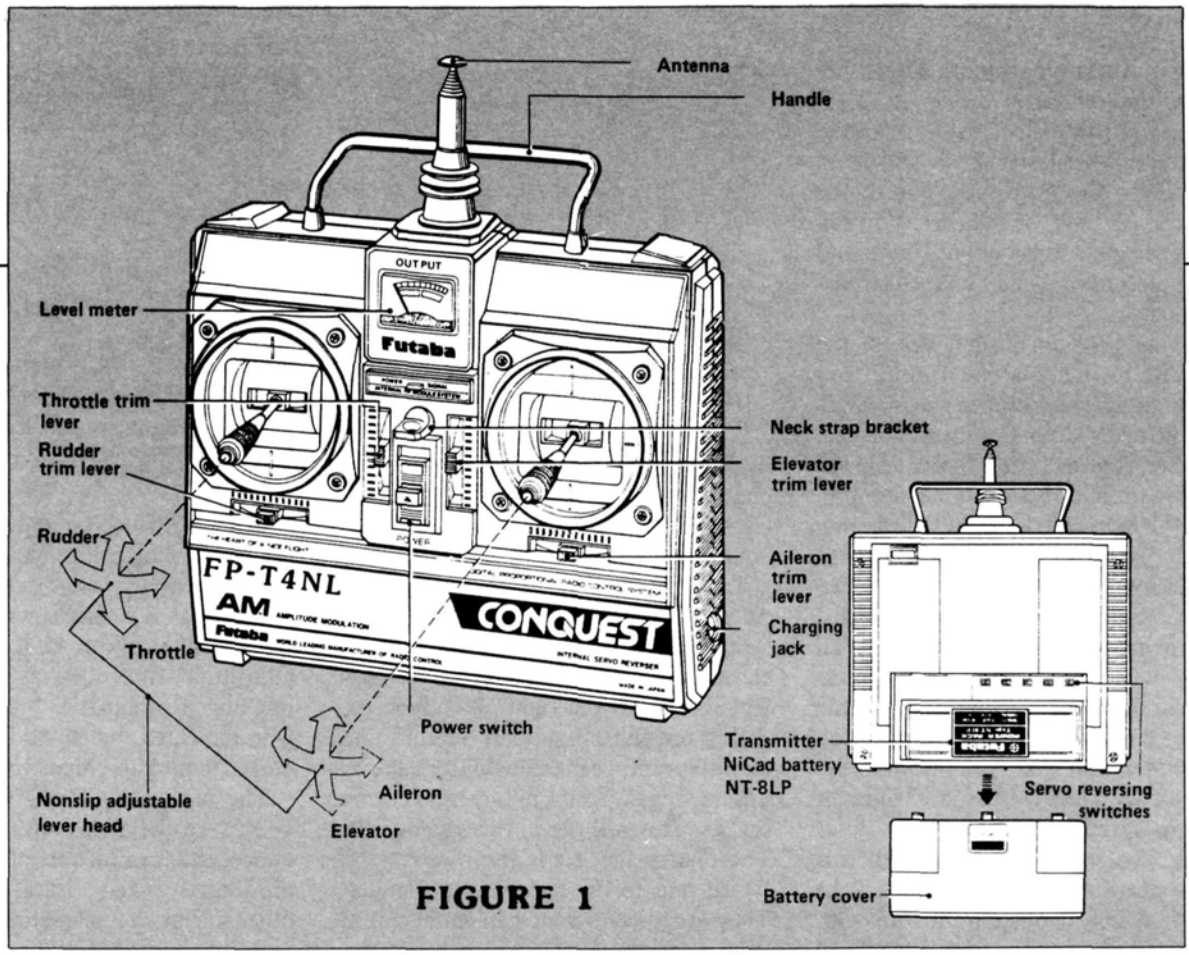


FIGURE 1

- Three-wire gold-plated 3-pin mini connector.
- Special grommet simplifies mounting of the servo and has an excellent cushioning effect.
- Six special adjustable splined horns available (four provided).
- High 48.7 ounce-inch (3.5 kg-cm) maximum output torque allows use in almost any model.

In addition to the hardware data, the Conquest 4 has a six-page instruction manual describing each system element with many drawings and isometric views. The transmitter airborne system and servo exploded-view drawings are particularly good. The heart of the Conquest 4 is the Mode II transmitter, so I'll start my review there.

At the top is an eight-section 37-inch long telescoping whip antenna located in the center of the transmitter top and behind it is a convenient ¼-inch diameter carrying handle measuring some 4 inches wide and 1 inch high. Directly below the telescoping antenna you'll find the rather large calibrated output level meter measuring 1 inch wide x ¾ inch high. It's very easy to see. The level meter is equally divided into a calibrated red

TRANSMITTER FP-T4NL

Operating System: two stick, servo reverse, aileron, elevator, rudder, and motor
Transmitting Frequency: 72 MHz band, 75 MHz band
Modulation System: AM
Power Requirement: 9.6V, nickel-cadmium battery (NT-8LP), 500 mAh
Current Drain: 190 mA
Dimensions: 7x6.8x2.2 inches
Weight: 1 pound, 13 ounces

RECEIVER FP-R7H

Receiving Frequency: 72 MHz band, 75 MHz band
Crystal Replacement System: Frequency can be changed within the same frequency band
Intermediate Frequency: 455 KHz
Power Requirement: 4.8V, nickel-cadmium battery, 500 mAh; common use with servo
Current Drain: 4.8V, 10 mA
Dimensions: 1.6x2.3x0.7 inches
Weight: 1.6 ounces

SERVO FP-S28

Control System: Positive pulse width control neutral 1.52ms
Operating Angle: One side 45° or more including trim
Power Requirement: 4.8V
Current Drain (Idle): 6.4 mA
Output Torque: 48.7 ounce-inches
Operating Speed: 0.24 seconds/60°
Dimensions: 0.8x1.6x1.6 inches
Weight: 1.87 ounces

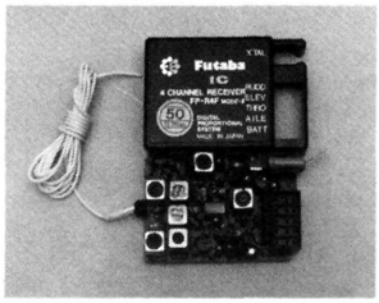
section and a silver section. With a full charge, the indicator needle is three-quarters into the silver section. As the transmitter is used, the needle will drop. When it's close to the red side of the indicator, it's time for a charge. You can normally expect to get about 1 hour and 40 minutes from a fully charged transmitter pack.

Moving back to the left side of the transmitter, there is the rudder and throttle stick. The Conquest radio series employs open gimbal construction like the G Series transmitters. Also, as in the G Series, the stick is adjustable in length, about ¼ inch. In addition, the spring tension on the sticks can be adjusted to your desired feel. Adjustment of elevator rudder, and aileron sticks are accessed from the rear of the transmitter, and I'll get to that later. The throttle control is detented and both rudder and throttle have electronic trims, not mechanical. The rudder trim is at the bottom under the stick bezel and the throttle trim is at the right of the stick bezel.

In the center of the transmitter there is a neck strap bracket and under it is the On/Off switch. Up is On, down is Off. Incidentally, the neck strap is provided as an accessory. Continuing to the right is the elevator-aileron adjustable stick with electronic trims, elevator trim to the left and aileron below the stick. On the lower right side of the transmitter (as viewed from the front) is the transmitter charging jack.

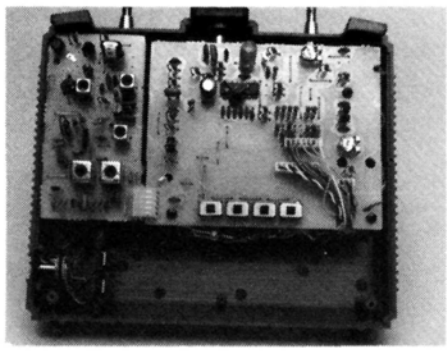
Moving to the transmitter rear side at the upper left is an access cover to the transmitter crystal. To remove the crystal, pop the cover off and remove the crystal by its tab. Remember, if you change frequency, you must change both receiver and transmitter crystals.

At the bottom is the removable battery cover, which slides down to reveal battery and servo-reversing switches. The battery can be removed by lifting the right end of the battery toward you.



photos by SUE KENNEY

The FP-R4F four-channel receiver weighs only 1.6 ounces.



Rear of transmitter with battery removed shows encoder board to right and four servo-reversing switches.

Tightly fitting spring clips are used to connect the battery to the transmitter electronics, so there is no soldering to connect a new battery—a nice feature.

Located above the transmitter battery pack are the four servo-reversing switches, left to right they are aileron, elevator, throttle, and rudder. Normal is left, reverse to the right. To adjust the spring tension on rudder, aileron, and elevator, remove the transmitter back by unscrewing the four Phillips-head corner screws. This will reveal two PC boards. The one to the left is the receiver RF board and to the right is the encoder. They are joined by a 5-pin connector at the lower common side of each board.

To expose the aileron-rudder adjustment screws, the RF board must be disconnected by gently pulling it to the left. Only the connector holds it in place when the back is off. With the elevator-aileron stick mechanics in view, the two upper left Phillips-head screws are for adjustment, elevator left and aileron right. For rudder adjustment, note the two $^{3}/_{16}$-inch diameter holes about one-third up the decoder board on the right side. The rudder adjustment screw is under the left hole. For all stick adjustments, clockwise movement makes the feel softer, counterclockwise stiffer. That about wraps up the transmitter.

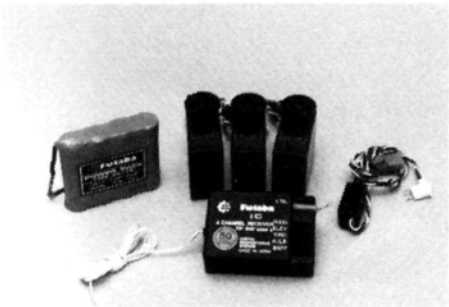
Moving on to the receiver, the first thing that struck me was its size. It measures only 1.6x2.3x0.7 inches and contains both receiver and decoder and a 5-plug receptacle. Futaba advertises that the receiver is triple tuned, however, only one crystal is evident, which indicates single conversion to 455K, IF, so some additional filtering was being done. Lacking a schematic, I called Futaba who indicated that three filters are employed to provide enhanced signal purity.

The servos employed with the FP-T4NL are the S-28s with a hefty 48.7 ounce-inches of torque, plenty for most moderately-sized aircraft. You'll see other salient characteristics in the chart.

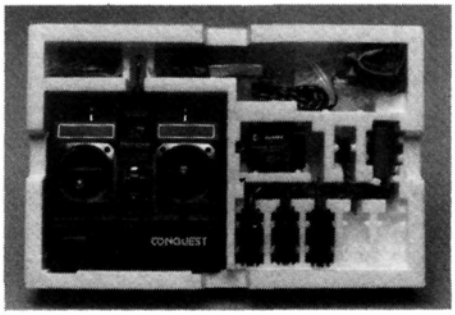
Before ending, I'd like to talk about the Conquest 4 accessories and there are a bunch. First is the FBC-8B charger. It charges the 9.6V, 500-mAh transmitter battery and the receiver 500-mAh 4.8V battery at 50 mA together or individually.

A unique feature of the charger is the use of just one light emitting diode (LED). First plug the charger into a 110V 60 outlet with nothing connected, then plug in the transmitter jack and note the LED lights red. When the receiver pack is plugged into the charger, the same LED turns from red to green. If you charge the receiver battery alone, the LED will glow a brighter green than when both receiver and transmitter are charging. Thus, to make sure you are charging both packs, plug in the trans-

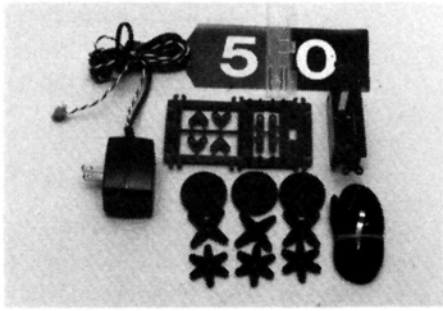
(Continued on page 98)



Airborne weight of batteries, 3 servos, receiver, and switch harness is 11 ounces.



System as it comes is well protected.



Accessories delivered with Futaba FP-4NL. Note neck strap and frequency tag.

Balsa USA

CITABRIA PRO

A very nice kit at a remarkable price, Citabria Pro is a winner.

by RON RODDA

AUGUST 2, 1968, saw the test flight of Champion Aircraft's new parasol-wing-configuration craft aimed at the advanced sportsman pilot. It utilized the tail and lower truss assembly of the akro Citabria and was stressed for 6 positive and 5 negative Gs. Powered by a Lycoming IO-360, it boasted a rate of climb of 1,700 feet per minute and was priced at $11,000.

For a whole lot less investment, Balsa USA* will sell you a kit of this aircraft which will enable you to appear at the local field with an out-of-the ordinary model. While hardly a model that will make CAP 21s, Lasers, or Dalotels run and hide, it does build into a smooth flying aircraft. Like all of Balsa USA's kits, it represents excellent value for your modeling dollar.

THE KIT. A deceptively small box housed the all-wood kit, which comes with an array of accessories you wouldn't expect in a kit so reasonably priced. The quality of the wood was excellent and the die-cutting quite crisp. Heavy-duty ABS cowl and wheelpants were flawlessly made and the pre-formed aluminum landing gear was plenty rugged for a craft this size. Various other pieces of hardware were part of the package, including pre-bent cabanes and lift struts.

"Packaged to please in price and quality."

The plans are very informative and show both wing panels. Ten pages of written material, including pictures, provide the necessary data to transform a lot of pieces into a flying model.

CONSTRUCTION. The fuselage is of stick-type construction, with sheeting added from the front of the cockpit to the firewall. Facilities are built into the front bottom for the landing gear and wing strut attachments. Wise use of lite ply results in these critical areas being strong without excess weight.

Tail surfaces are built up from balsa stock. Although this takes a little more effort than sheet surfaces, the use of Pacer's* Zap and Zap-A-Gap kept the overall time investment quite reasonable. When installing the tail surfaces, fabricate the functional tail brace wires from the included materials. This is basically soldering lugs on the ends of the wires and cutting to length, and it's easier to do this prior to covering the model.

The wing is 80 inches long and is built in three

A striking pose, the Citabria Pro commands attention.

sections. The two panels together with the center section create 1,120 square inches of lifting surface. The barn door ailerons are also built-up construction. When installing the strut attachment and cabane blocks, use come scrap for extra reinforcement.

Some areas of construction that might have been a little tricky proved to be straightforward due to the detailed step-by-step instructions and plans. As they advise, take a critical look at the wing alignment when installing the struts, as they can be used to remove any unwanted misalignment in either wing panel.

After a session with the sandpaper, fellow club member Rod Schurtz took the airframe and covered it with WorldTex from World Engines*. This fabric iron-on is very easy to apply and gives the Citabria an authentic appearance. The cowl, wheelpants, and struts were painted with K&B* epoxy paint. Some trim along the color separation finished the cosmetic work.

I installed a Futaba* G Series radio with room to spare. The fuselage is quite spacious for any radio installation and fiberglass pushrods connect servos to rear surfaces. I mounted an O.S. 1.2 four-cycle engine (inverted) from Great Planes Model Distributors* and it fit perfectly inside the cowl. The addition of an on-board glow plus battery provided further insurance.

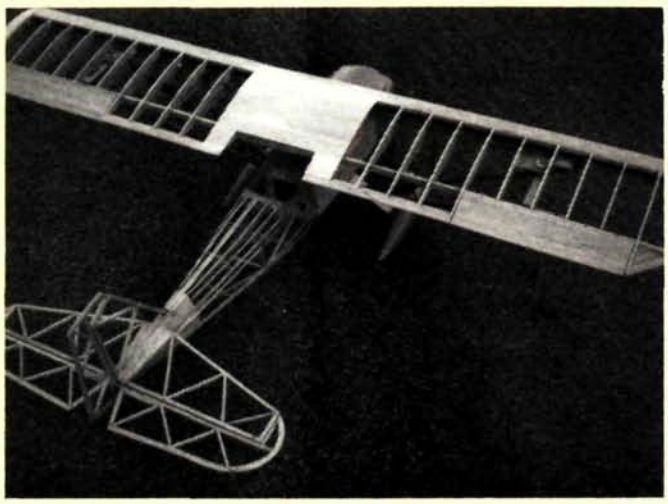
Careful weigh-in revealed a total weight of 11 pounds, 9 ounces. This seemed quite acceptable for an airplane this size and, with the 1,120 square inches of wing supporting the aircraft, resulted in 24 ounces per square foot.

FLYING. A beautiful February day at the East Bay R/C field was chosen for the maiden voyage. With the 1.2 purring, gentle breezes urging me on, and Steve Lock ready with the camera, it was time to fly.

I removed the cowl for extra cooling for the new engine and advanced the throttle. I used generous amounts of right rudder to overcome the effect of torque and the Citabria was airborne after a short run. The gentle handling characteristics were immediately apparent as I made repeated passes for the camera.

Tracking through loops was accurate and aileron rolls were graceful. Low and slow passes aren't normally my cup of tea on maiden voyages, but the Citabria was such a

(Continued on page 93)



The built-up structure provides a light airframe.

Ready to cover, the Balsa USA kit is a featherweight.

I forgot that this was no boat and wasn't restricted to water.

CONTRARY TO WHAT you might think, this is *not* an airboat. It's an Extremely Low Altitude All Smooth Terrain Aircraft (ELAASTA)! There's no water rudder and no water prop. But enough of this, let me start at the beginning and then you'll understand.

Charles (Bud) Cooley is a genius and my friend. For these reasons I anxiously awaited the result of a pile of plywood and hardware which he traded me out of. In less than a week he was back with Gator Bait, which he mistakenly called an airboat. Geniuses are occasionally wrong too! Here's how he proved it.

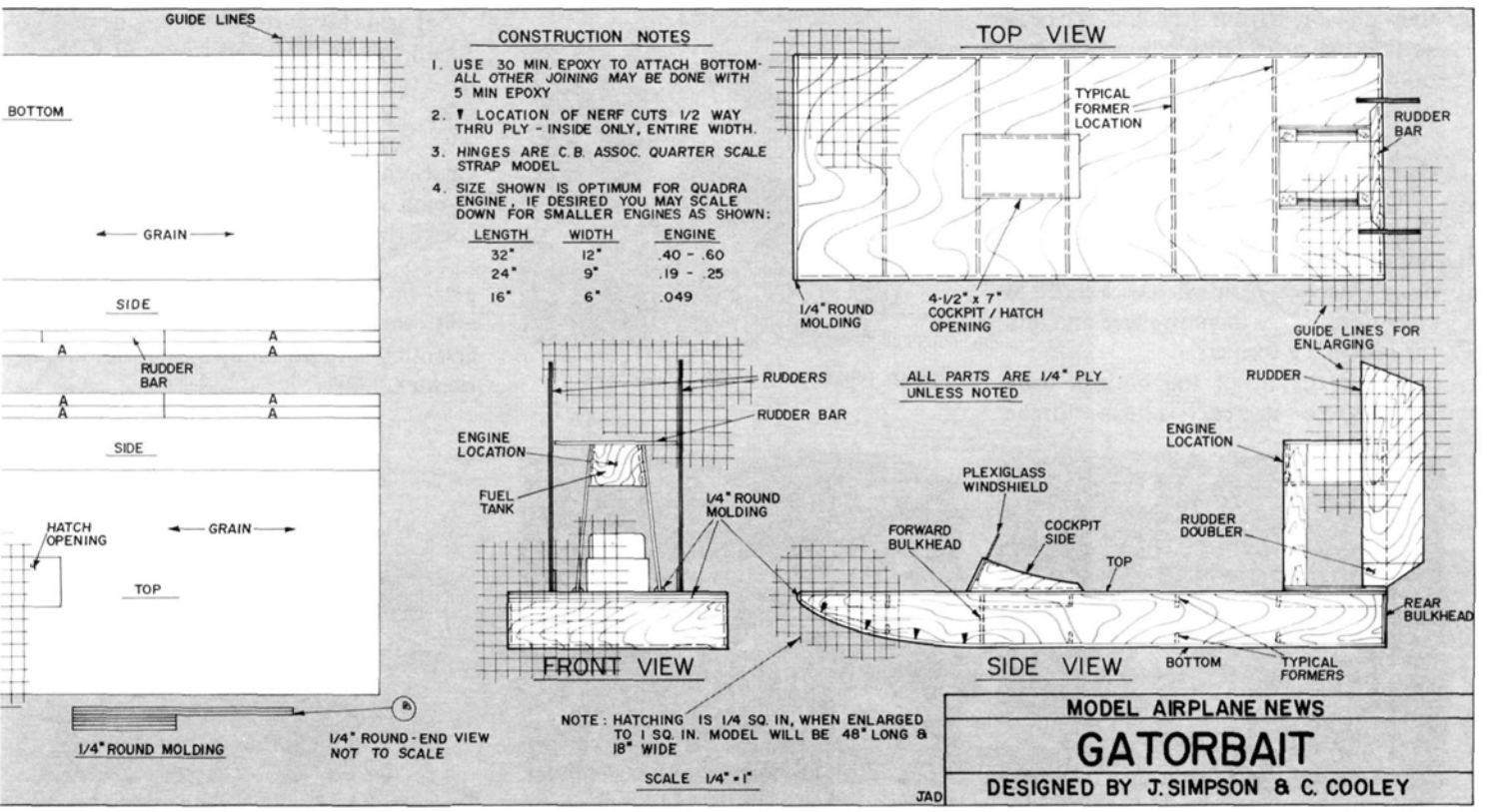
The completed hull ready for your favorite paint job.

We took Gator Bait with us to the flying field one afternoon because there is a small lake adjacent to the runway. Shortly after launch Bud had old Gator Bait wound up pretty good and heading for the cattails! No problem, the 18-inch prop cut a 1½-foot swath right through the middle of them. It then went around into a horizontal figure 9 heading right into shore. I wondered why Bud waited so long to throttle back and I was going to tell him that he had no reverse when the nose crossed the shoreline! Hah, no problem again. I had forgotten that this was no boat and wasn't restricted to water. The ELAASTA continued across the narrow sandy beach and made a wide 180° lateral turn over the grass, back across the beach, and on over the water. This is a *fun* machine, not a boring two-dimensional single-channel gas burner.

Don't be too concerned about engine size because I think it will run with anything from a .40 on up. We used a Quadra 35 because it is inexpensive and exciting!

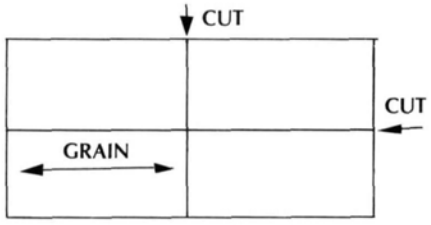
CONSTRUCTION. The prototype was built with the highest quality aircraft-grade plywood. The second model was built with inexpensive ¼-inch interior paneling. If you want to keep the cost down, go to your lumber company or hardware store, buy a length of quarter-round wood molding strip, and choose a 4x8-foot sheet of paneling. Natural birch or mahogany is best. Avoid plastic laminates. For ease of transport, you might have to cut the sheet in half, once each way, so the result will be four panels 2x4-feet in size, with the grain running lengthwise.

Study the plan of the parts outline and you'll notice all cuts are straight except for the two sides toward the bow. That curve is not critical so if you don't want to scale it with squares, just



DRAWINGS THAT YOU CAN SCALE UP ARE AVAILABLE...PAGES 124, 125

trace the bend of a piece of balsa; use the side of your shoe or whatever. Mark the parts outline on the plywood sheets as shown in the drawings so you can cut out all the plywood parts. It's important that the sides and the end are the same depth. It's also important that the engine mount and tank bulkheads be absolutely symmetrical.

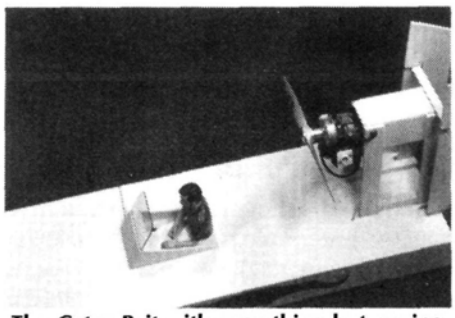


When you cut the parts, don't throw away the scraps because you can use them for braces, radio and servo mounts, tank spacers, and so forth. To cut the hatch opening, simply drill a hole and use a small sabre saw, keyhole saw, or an X-Acto knife, and be careful. Also remember to have a wood backup behind each hole drilled, so the result will be a clean, round hole instead of a splintered mess.

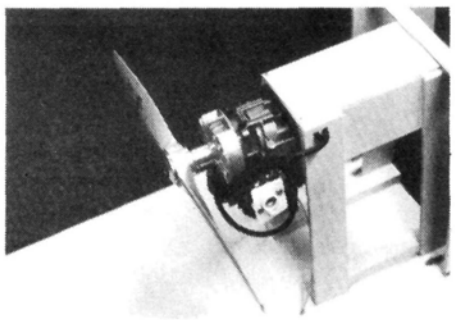
Build this craft upside down and begin by marking former locations on the upper deck. Use epoxy and glue the two engine mount formers in place. Be sure they are ¼ inch from the end of the deck so that, when set, they'll brace the rear bulkhead in the upright position, perpendicular to the deck.

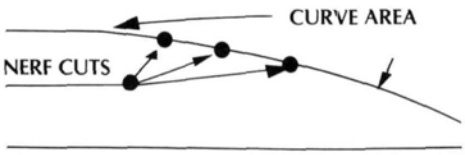
Add all remaining formers and frame the hatch opening next. Make sure that ¼ inch clearance exists at each end of each former to permit the sides to be installed flush with the edge of the top deck. Once you're satisfied with the fit of each side, epoxy them in place and add the remaining formers.

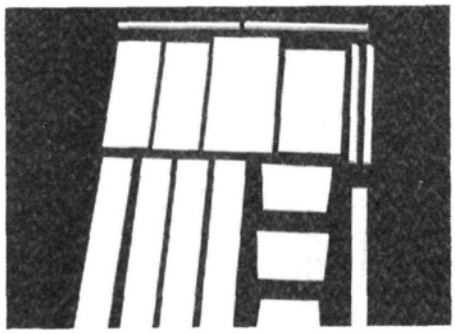
Check the fit of the bottom deck formers to be sure each is flush with the sides. Set the bottom deck in place and if it's too stiff to match the curve of the sides, you'll need to make some nerf cuts. (I tried wetting the paneling and bending it, but that didn't work.) The prototype bottom is ⅛-inch plywood and it was thin enough to bend around the curve.


The Gator Bait with everything but engine enclosed keeps things clean.

To make nerf cuts you must set the table saw blade so it extends only ⅛ inch above the surface. Make some practice cuts on scraps. Resist the temptation to put your hands on the paneling immediately above the area where the blade is. When you're satisfied with the depth of cut, mark the bottom deck at three points equidistant around the curve and make the cuts all the way across.


Fuel tank is mounted directly behind engine. Note throttle linkage coming from hull.



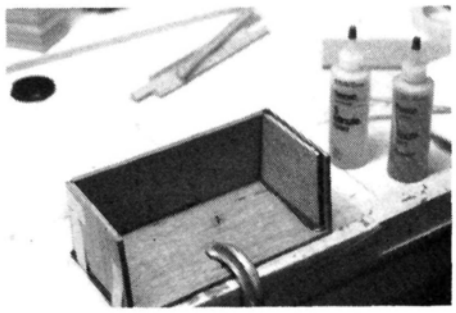

Parts count is quite low.

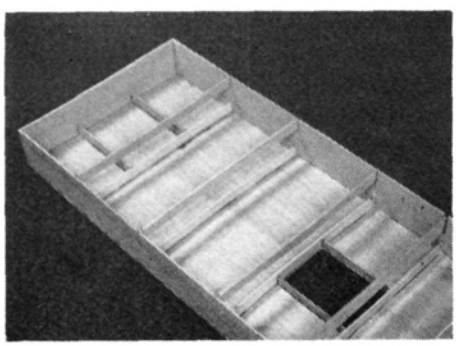
Glue the bottom in place with slow-cure epoxy and, when set, add the bow piece and sand the entire assembly smooth.

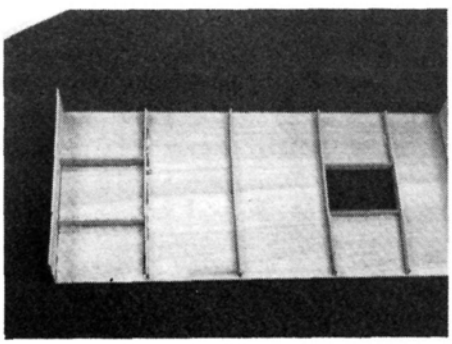
Set aside the parts for the engine pod. Again, be sure the firewall and end pieces have the same exact slope on the angled sides and that they are the same size. Also, be sure the legs are the same length. Check the firewall doubler fit to be sure a ¼-inch gap exists on each side, then epoxy them together.

Epoxy the firewall and one side in place on the pod floor. Add the end piece and other side in that order. Sand this assembly smooth on all sides, top, and bottom.

(Continued on page 102)


Engine pod should be square and true.

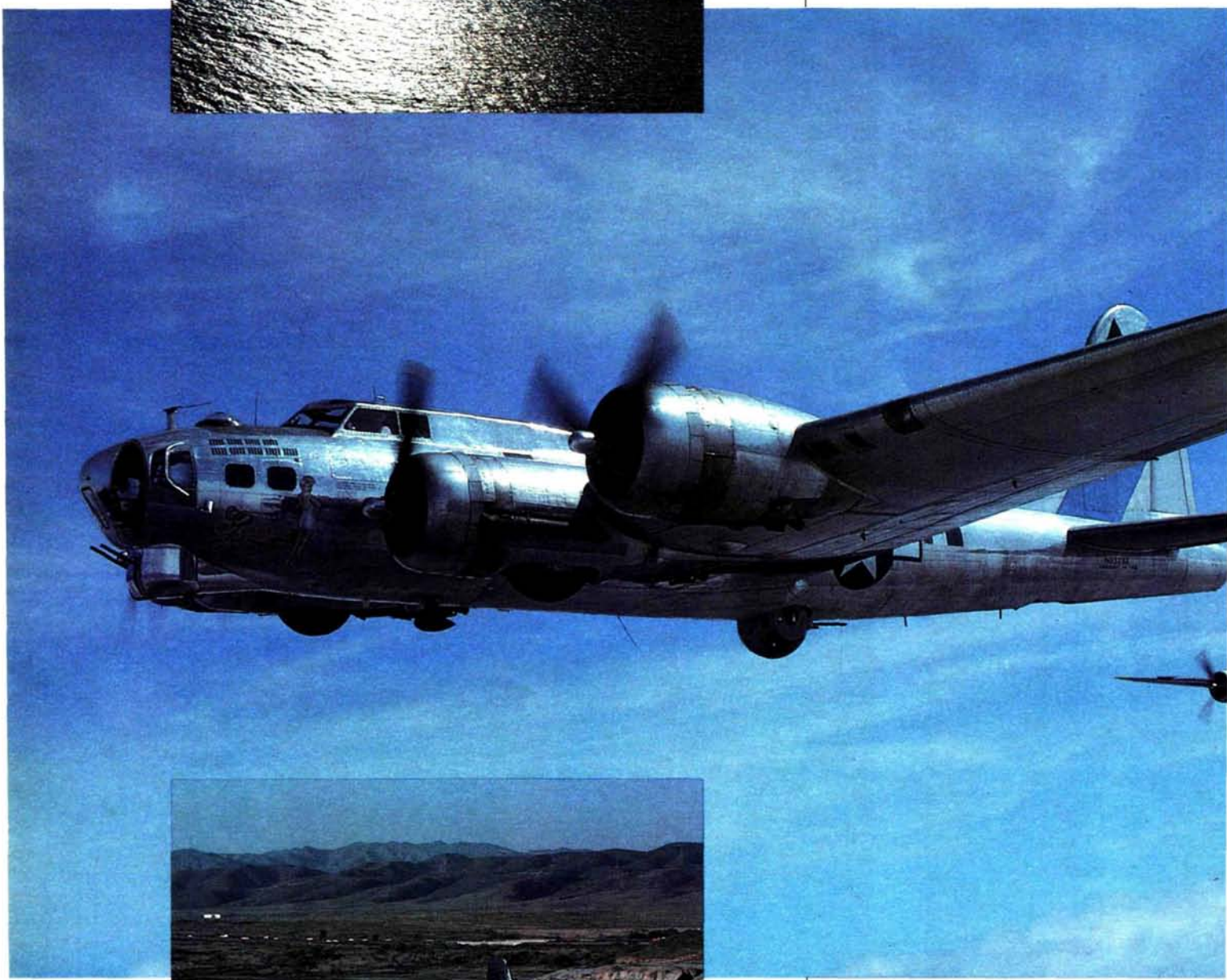

Hull cross braces are simple and give adequate support.


Top deck of hull is laid flat and is built upon.


The cockpit is assembled and installed last.

article and photographs
by BUDD DAVISSON

Be it Corsairs (left and far below) over the Pacific or P-51s on a fly-by (far right), WW II aircraft have found a niche in our soul.



The B-17s above could be returning from a raid over Germany or engaged in a peaceful fly-by at Oshkosh.

WARBIRD FEVER!

BOY! HOW THE times have changed. It wasn't that long ago that the arrival of a Mustang or similar warbird at a fly-in was the event of the week. These days, however, warbirds are such an integral part of sport aviation that it would be easy for anyone coming into the movement in the last ten years to assume it has always been that way. Just the opposite is true.

So many warbirds were turned into steam kettles and beer cans after the war that they came darned close to extinction. In fact, some of the less popular airplanes, like P-61 Black Widows, are known to exist only as wrecks on remote mountain tops (like one being salvaged by the Mid-Atlantic Air Museum in New Guinea) and other airplanes, like the Republic P-43 Lancer and the Curtiss-Wright CW-21 Demon, aren't known to exist in any form, anywhere.

If the movement to save the warbirds can be traced to any single event, it would have to be when two Texas crop-dusters, Lefty Gardner and Lloyd Nolan, decided to buy a surplus Bearcat. In the course of the acquisition they had the sudden realization that the number of surviving WW II airplanes was dwindling so fast, they were going to be gone in only a few years.

Returning home with their F8F, they rallied a bunch of fellow Texans together and formed the Confederate Air Force (well, the other side of the Civil War already had an air force). Their goal was, and is, to put at least one of every known type of WW II combat plane back into the air.

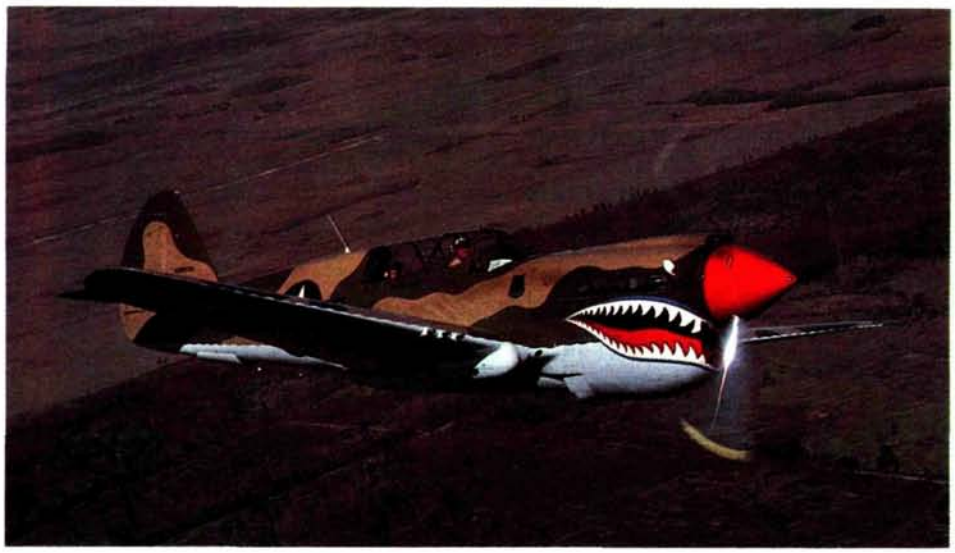
That was in the early 1960s, a decade that saw a gradual awakening of interest in the old airplanes. Lots of guys who liked big iron began scouring the countryside for abandoned or surplus fighters for sale. Some of them formed their own warbird associations, like the Warbirds of America, which eventually became a division of the EAA.

By the 1970s, the movement was in full swing and we began to see the formation of numerous flying museums in which warbirds were restored to be flown. Today, there have to be close to a dozen museums of this type, from the Kermit Weeks Museum in Miami, Florida, to the Kalamazoo Aviation History Museum (Kal-AirZoo) in Michigan, to Ed Maloney's Planes of Fame in California, and all points in between. These are airplanes meant to fly and almost every fly-in worth its salt has hard-charging birds from several of the museums on hand.

It has gotten really exciting. For one thing, you never know what you're going to see. At Oshkosh there was a lineup of a B-17, a B-24, a B-25, a B-26, and a B-29. You don't get too many more "B"s than that. Then, to liven things up, an A-20 Havoc showed up, which was the first many of us had seen.

To the real buffs walking the line, the history and the rarity are what make each new arrival exciting. We know, for instance, when a Spitfire taxies up, that there are only two or

WARBIRD FEVER!



The P-40, manufactured in the thousands for wartime use, is now only represented by a scarce few.

three other Spits flying in the U.S., which makes the sight that much more memorable.

For the most part, however, the general public still thinks the Arizona desert is covered with surplus WW II airplanes, there for the taking. They cannot possibly imagine the work and money that goes into restoring something as rare and unusual as a Spitfire or an A-20. Or any of the heavies for that matter.

But it's the Mustang that has formed the backbone of the movement. Discount the trusty P-51 and there aren't 50 fighters airworthy today. The over 100 Mustangs around today survived for the same reason all thoroughbreds survive; its basic quality and usefulness allowed it to escape the beer can machines in greater numbers than any of its peers. It was an integral part of our National Guard Squadrons into the very late 1950s and Canadian airplanes released in the early '60s contributed heavily to the present population. Central American countries released their Mustangs steadily through the 1960s and even today, in 1986, the Mustangs operated by the Dominican Republic last year are for sale.

Of course, you can't buy a Mustang for $1,000 anymore. In fact, the going price for a decent P-51 will start around $250,000 and there is a line around the block for airplanes in that price range. Add to that operating costs in the area of $450 an hour (fuel: 60 gallons per hour, a gallon or more of oil, engine overhaul $30,000) and you can see this is not a casual hobby. You have to be bucks-up and truly

Above: The P-51 Mustang carries with it a distinct shape and sound that spell "classic."

The B-25, for most, only exists as a fond memory.

Reminiscent of WW II, a P-51 gives sky cover to a B-17.

driven to face the financial and mechanical problems an airplane like this represents. You have to be over the cash barrier or the airplane owns you, you don't own it.

The Mustangs are always with us, but the other warbirds came slowly. For instance, when they made the movie *Tora! Tora! Tora!* they could only come up with two flyable P-40s and one of them was short parts to retract the landing gear. Today there are at least a dozen flyable and another dozen being restored.

For no apparent reason, the Navy birds, the Corsair, the Wildcat, and the Hellcat, lagged far behind the Mustang. In fact, until the TV show *Baa, Baa, Black Sheep* again made Pappy Boyington a household name, you could buy Corsairs for half the price of a Mustang. Even so, until a bunch of F4U-5Ns were brought in from Central America a few years back, there weren't more than a handful of Corsairs flying.

The really rare flying machines are the foreign ones. Although there are a few Spitfires flying and more are joining the fleet every day, that's about it for the nation's (and world's) warbird population. A couple of Hurricanes do fly and periodically someone gets a Spanish-built Me-109 (no German ones fly) in the air only to crash it, and Maloney's Museum has the only airworthy Zero, but in general, the foreign airplanes haven't faired well. Of course, there is the Junkers JU-52, which technically is a warbird, and there are a few of those around.

A really wild trend that was obvious at the Valiant Air Command show this year in Titusville is the move toward early jets. At Titusville three British Venom fighters were parked beside a couple of T-33s. The last two warbird champions at Oshkosh have been jets; an F9F-2 Panther and (are you ready for this?) a personally owned T-38 Talon. How'd you like to own your own Mach 1.0 transport?

When the crowd moves up to a flawlessly restored B-25 or Mustang, what they can't appreciate is the problem in finding parts. And the hardest parts to find aren't the ones to keep the airplane flying, but the miscellaneous brackets and black boxes that are absolutely necessary to make the airplane authentic. Where, for instance, do you find the armored seat pan that was under the turret gunner in a TBM Avenger? Or the little flat iron deflectors that sat on top of the fuselage of a B-25 behind the turret and kept the gunner from shooting his own tail off? It takes lots and lots of detective work. When Joe Dulvick was doing his TBM he located wrecks on mountain tops all over the Western U.S. and hiked in to get the little bits and pieces he needed.

But you never now where you'll stumble across a trove of warbird treasure. Just last year a collector found a junk yard in Georgia that had millions and millions of parts for WW II aircraft. Included were nearly 300 turrets, two of which were the only B-25C ball turrets known to exist.

Although the finds are becoming more and more rare, they still exist. Gene Fisher found two butchered B-25s hulks behind a barn in New Jersey where the farmer had dumped them in 1946 after buying them for the wheels. John Paul resurrected a P-40 that had been buried for 35 years. A farm in Canada yielded dozens of rusting hulks for BT-14s and Swordfish torpedo bombing biplanes.

Like arrowheads and antiques, old airplane parts are where you find them and you never know what you'll find when you turn over the next rock. That's what makes it so much fun.

Some countries, England being the best example, maintain a flying museum of their own. In fact, the British are so proud of their history that artifacts like airplanes and ships are maintained as part of the active military inventory. This isn't so in the U.S. Although the various military and governmental museums strive to present aircraft that are important and historic, they are missing something—something important. You can look at a Mustang until you're blue in the face, but until you've heard the distinctive Merlin bark out of those short stacks you'll never know the soul of the machine. You can't grasp the majesty of a Corsair, until you watch it round out for landing and little puffs of smoke come from each main gear as they touch pavement.

You can capture a little of the emotion of the times when you stand at Oshkosh and watch a Mustang pull up out of a five-ship V saluting those who didn't return with the "missing man" formation. For thousands and thousands of people, the only chance they'll have to know the sounds and smells of those steeds that carried our warriors to an aerial war will be at fly-ins, not at museums. If an airplane is so rare that it represents the entire surviving breed, then there is no doubt that it should be encased in a museum display. But as long as there are one or two others, they should be allowed to fly and reach out to touch whatever it is inside us that makes us gravitate toward the big iron. We can thank the dedicated civilian enthusiasts who have made it possible for new generations to share the experience.

It is essential to keep a few of each type flying because stuffed birds don't sing and it is their song that is their soul.

Model Airplane News *has a beautiful collection of warbird posters available to the modeling and aviation buff. These museum quality posters are enlarged photos taken by the incomparable master of aviation photography, Budd Davisson.* *For more information, turn to pages 128 and 129.*

■

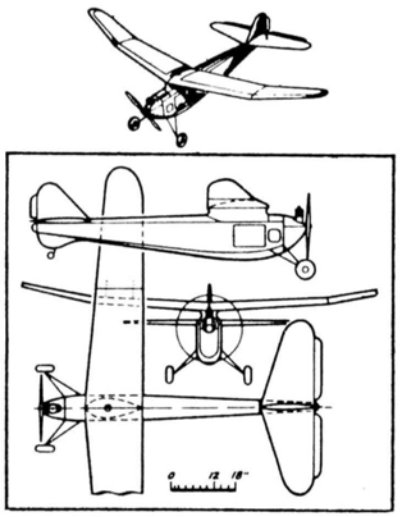
The Golden Age

by HAL "PAPPY" deBOLT

I THINK of the early days of R/C as being the era of single-channel rudder only, however, some of the innovators were using forms of multi-control long before the popular methods evolved. The Good Brothers' Guff had rudder and elevator, using *two separate* R/C systems. I flew a similar setup using 465 and a 27 in a Cruiser, but the bulk and weight handicap were a bit much.

Seigfried's "flying telephone exchange" was probably the first multi-control. This concept used separate receivers (one for each control function), and a clock-work device which served as the control actuator. At the transmitter a rotary "telephone dial" selected the desired controls. As you can imagine, it was complex and the volume and weight were enormous. The plane required to hold all this was large, even by giant-scale standards, yet the power was only a normal-size engine! The result was good enough for a second place at Nats events. More practical multi-control was demonstrated by Jim Walker with several post-war Nats wins.

A true genius and an innovator in the hobby was Jim Walker, shown here with his Brown Junior-powered Nats winner.



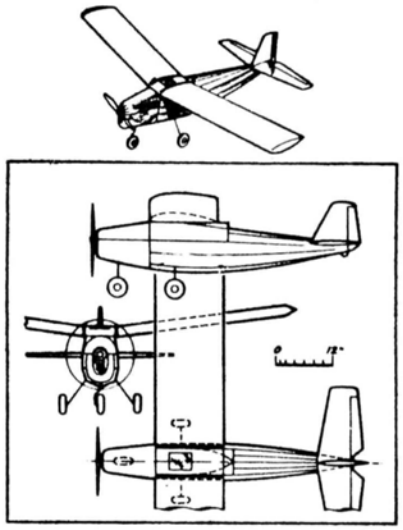
Seigfried's designs were innovative and original.

I think of Jim Walker as "Mr. U-Control." I also know him as an undying showman with his multi-control plane and "Sabre dance" U-Control flying. The stories of his exploits are endless, and the ingenious innovator that he was makes his multi-control system different and interesting.

Walker's airplane designs were more modern than others of the time. He apparently went through several designs before sticking with the one shown here. It was said that he managed some form of inverted flight (a first?) with this one. Note that many of today's designers wouldn't be ashamed of the general arrangement. For the most part his later models appeared to be exceptionally sturdy, depending on ample power for their performance. The engine probably was an Orwick .64.

The Walker R/C system used two separate radios; one controlled the engine and the other operated the rudder in a proportional fashion. The heart of the rudder actuator was a fluid clutch. Remember the Buick "Dynaflow" transmission?

The actuator was both ingenious and interesting. The single-channel receiver could vary the rpm of the electric motor which drove the fluid clutch. The power output of the clutch related to the speed at which the motor moved the clutch fluid. Low speed was little power, high speed was maximum power. The actuator's output arm was spring-loaded in one direction, say, left rudder. As the clutch power was increased, it worked against the spring tension, moving the output arm toward the right. Thus, with no clutch power, the spring provided full left rudder. Full clutch power moved the



These drawings of Walker's design demonstrate his ingenuity.

arm to full right rudder. Any clutch power that was less than full allowed various positions in between. It was a tricky mechanism to set up and Jim developed it extensively over several years.

With the ignition engines used, the rpm could be varied with the position of the spark timer. For a two-speed ability, a timer was fabricated which had two pairs of contacts, one set positioned for low speed another for high speed. Walker could switch from one to the other by means of a double throw relay added into the ignition circuit. He could also pulse between the two, resulting in an effective intermediate speed. Along with his virtues, Jim was also secretive, so details of his doings were often unknown.

Jim's last R/C Nats effort was at the '53 event, where his one flight attempt was unsuccessful. Not long after, we lost Jim and it's interesting to speculate what his inquisitive mind might yet have added to R/C.

I had a nice letter from Eugene Foxworthy now of West Union, West Virginia. Gene was the 1950 Nats Champion and went on to direct the 1951 event won by Jim Walker. Gene was in the Indianapolis area at that time, where he collaborated with Vernon McNabb on the initial C-S 465 system.

The model Gene is holding in the photo is a ¾-size version of his Nats-winning Hoosier Hot Shot that was built in 1950 and is still flying with the original 6-meter R/C gear. Today the big Hot Shot would make an interesting old time R/C project. This is a well-engineered design so let's look it over.

Gene Foxworthy was a leader in early R/C developments and his Hoosier Hot Shot was a consistent winner, including the 1950 Nats radio championship.

A mellowed Gene Foxworthy today with his 36-year-old ¾-size Hoosier Hot Shot.

Many early modelers followed the teachings of *M.A.N.*'s Charles Grant for their aerodynamics, as did Kenneth Ernst when he laid the Hoosier Hot Shot on paper. The Grant influence is notable with the low lateral area, high CG, and thrust line, but there is also Ernst's originality. For example, the twin rudders kept the lateral area low and solved a shortcoming of many single-rudder designs. The rudder effect with most single-rudder designs was much more acute with the power on than in the glide mode, due to the propeller slipstream effect. Gene wanted rudder action to be equal, power on or off, so the twin rudders were located *outside* the slipstream.

The use of wing slots was a clever idea

when you know the reasoning and results. Normally I think of slots as a method of delaying a wing's stall and increasing lift at high attack angles. Jet liners are a modern example of this; they make low-speed flight possible. However, a further advantage was obtained with the Hot Shot. With normal wings the nose will drop when you turn with rudder due to the loss of some wing lift in the bank. Effectively, in a tight banked turn, a wing is operating at a higher angle of attack than in level flight. With a slotted wing, the slots go to work as the attack angle is increased, resulting in more lift to compensate for the normal loss in a turn; good thinking if you want spiral stability!

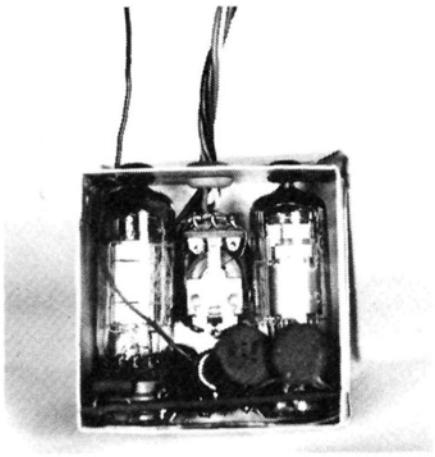
This design was conceived to cure the spiral stability problems which were acute with many free-flight cabin designs of that day. It was said that the original Hot Shot turned so flat that you couldn't lose altitude in a tight turn, thus there was no elevation control. Changes had to be made to *reduce* the spiral stability. This was just the opposite of other designer's problems.

Actually, at a 6-foot span and 5-pound weight, the Hoosier Hot Shot performed very well with only a .30 engine. Any sport .40 two-stroke or even four-stroke should suit it nicely for realistic flight. With a modern radio providing full controls, the performance should be far beyond what Foxworthy had when he won the Nats. I envision a most delightful way to fly!

Who introduced ailerons to R/C? It could possibly have been Gene Foxworthy. At a Selinsgrove Fly-In Gene demonstrated a small single-channel Hot Shot with a large aileron on *only one* wing panel. It was thought that two would require too much power from the escapement actuator. Gene amazed all of us with really beautiful consecutive axial rolls the length of the field. In more recent times several Formula I and ¼ Midget racers have successfully taken advantage of this idea.

Single-channel persisted for some time, while modelers worked hard to improve on the initial radio shortcomings. The RK-61 gas tube got us started, but its unpredictable characteristics were a headache. A possible solution was found in the XFG-1 gas tube, but the lack of sensitivity gave it questionable value. Innovators of the time tried using newly developed "hard tubes," which didn't rely on gas for operation. While they required more complex circuitry, the reliability seemed to be an asset.

Howard McEntee took up this challenge and his "Simple-Single" was assembled by many. Yes, part of the hobby was *building* radios then. This one was similar to the Aerotrol type receiver with its single tube (the Raytheon 3S4), relay, and other components. While more stable than the gas tubers, these receivers did have a higher current drain, requiring heavier batteries. Quickly following this



Step two in receiver design, a typical single-channel hard tube receiver. Note tubes flank the relay at center.

step forward came the addition of a second amplifier tube, creating a design parallel to the popular Lorenz receiver using two RK-61s.

The popularity of this step in progress was short-lived because of a growing R/C problem and another advancement to combat it. To understand you should know that most all initial systems operated by using the frequency carrier only, shutting it off and on provided the code information needed to select control action. While the new Citizen's Band was welcomed by R/Cers, it was soon swamped by communications, which often had more sophisticated higher-powered equipment than we enjoyed. Thus the first major source of interference was born and we've had to contend with it ever since. The answer was to resort to a more complex method of coding, which is the basis of the fine radios we have today. It has been highly developed along the way. The birth of that will have to wait for another time.

Speaking of another phase of OT R/C, what do you think about building and flying these early designs today? For example, not too long ago I had the opportunity to fly an ancient Live Wire Rebel and a Taurus. Their performance was outstanding, even by today's standards. Considering the age of the equipment, you have to wonder how much better they would be with modern radios and engines. I'm sure that some of you have done it and will have some clues for the rest of us.

I can offer some suggestions. First you need to decide what performance you'd like. Do you want to duplicate the early style or go for the best modern equipment offered? Either way the flying weight should be much less than the original. For instance, if you just want rudder and engine control on a real early bird, the modern R/C will weigh half as much as the original. If your choice used multi-control reeds, the weight savings would be even more, perhaps as much as 75%. Also remember that modern structures and covering materials are lighter.

There seems to be a wide range of choices for powering the oldsters, no matter what kind of performance you want. Actually, knowing how the original power compares to today's is a help. Many early '50s designs used .19 glow engines. A modern .15 would probably be equal or better. Others used .29s which equate to today's .21s. Later on the popular pattern engine was the K&B .45, and the weakest of today's sport .40s would easily match that one.

The early engines had questionable speed controls. Our reliable throttles are a great advantage. If you have too much power, you just throttle back.

Another thought is the use of four-strokes. For early style flying a direct displacement match might do; just one notch larger would provide assurance. Just think of it, an old timer and a four-stroke would be an interesting combination.

Don't overlook electric power as an ideal way to duplicate early flight. With modern R/C, most of the early designs could easily carry the needed batteries. For example, you might consider a 15 to 25 geared electric motor as power equal to the original .19 engines. This is another way to combine the old with the new for some exciting action!

If you're looking for modern performance that would be faster and easier to maneuver, take a look at a similar size model of today's standards. Whatever power is called for should fit the oldster also.

(Continued on page 103)

Kyosho O·P·T·I·M·A

**Faster than a speeding bullet—
Able to leap the roughest terrain in a single bound—
The Optima has it all!**

THE KYOSHO LINE of R C kits, distributed by Great Planes Model Distributors*, includes everything from planes to cars and boats. Their car line has something to suit everyone's taste from the four-wheel-drive .21 gas-powered Integra Vanning to the four-wheel-drive electric off-road Optima. The Optima was designed to be competitive on the racing circuit straight out of the box, but with the addition of the optional ball bearing kit and a hopped-up motor, championship performance can be expected.

THE KIT. The Optima comes attractively packaged

photos by Louis DeFrancesco, Jr.

by DAVID TROST, M.D.

in a large box covered with many full-color pictures of the car from various angles. All parts are well packed to prevent damage during shipping. The 31-page assembly manual is very complete and it contains all the information needed to build the car and much more. It has a table which explains the pros and cons of each of the different Kyosho chargers, it tells about the optional Kyosho LeMans motors, and it gives a good description of the recommended front and rear end adjustments. The radio installation section of the manual contains specific installation instructions by manufacturer and servo model for the most commonly used radios.

CONSTRUCTION. The assembly of the Optima is organized into 44 nicely illustrated steps which are explained in the manual. There is no need for me to comment about specific assembly steps, because the building instructions are so good and all parts fit very well.

The Optima's main chassis consists of eight aluminum pieces. These parts bolt together to form cages in the front and rear which enclose the gear boxes and are connected by two aluminum bars. The gear boxes are molded of fiber-filled nylon and house the differential in the front and the differential and some of the drive gears in the rear. The differential housings are also made of fiber-filled nylon and contain metal gears. Each differential is supported by two ball bearings. Power is transmitted to the front differential by a fully enclosed chain-drive system, which works well and is not subject to the wear that would occur with an open system. Two different differential gear ratios are provided so that the builder can vary the relative speeds of the front and rear wheels. I set up my car so that the front and rear wheels rotate at the same rate.

The front and rear suspension systems are constructed largely of fiber-filled nylon for strength and lightness. Both consist of extra-long double wishbones for handling uneven terrain with minimal effects on steering. Dampening is provided by coil-over oil-filled shocks on all four wheels. Both the front and rear suspensions have adjustable camber and ground clearance. Each of the front and rear axles are supported by two plastic bushings. Kyosho offers ball bearings as an option. The four tires are of a spiked design similar to those on most R/C off-road cars.

The radio control is mounted on a fiberglass plate, which also serves to stiffen the main chassis and hold the motor battery. Parts are provided to mount just about any of the common standard or mini servos. The resistor type speed controller provides three forward, one braking, and two reverse speeds. The controller also has a voltage step-down circuit so that the radio control can run

O.P.T.I.M.A

off of the 7.2-volt motor battery. I used a JR Circus* four-channel radio with two NES-505 servos in my car.

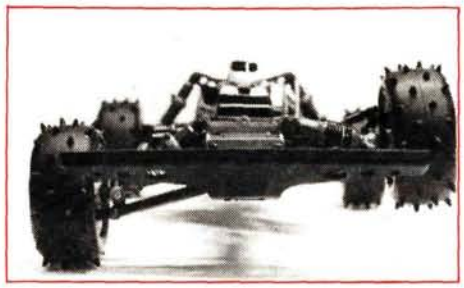
The motor and battery used for this review were the LeMans 480G and the Kyosho 6-cell, 1,200-mAh racing battery. The Optima comes with an RS 540 motor but I wanted to take advantage of one of the other powerplants available.

The Kyosho LeMans motors are modified, high-performance motors and there are six of them available. The LeMans model numbers are based on the motor's expected run time (in seconds) using a six-cell, 1,200-mAh battery pack. All of the LeMans series motors have adjustable timing, diamond-trued commutators, and coils potted in epoxy resin, and all of the motors except the 600E have dual ball bearings. The 480G also features a machined aluminum endbell for durability.

Optima chassis complete with radio installed, ready for body. Car is four-wheel drive.

The car is completed by trimming the clear polycarbonate body and driver/radio cover along marked lines and finishing them on the inside with paint. A nice set of pressure-sensitive decals was provided for the outside. I used the Tamiya paint specially formulated for polycarbonate bodies.

Above: New Kyosho Auto Charger provided plenty of juice. Below: Note ample suspension travel to handle the roughest terrain.



A Kyosho Auto Charger was used to get the most out of the battery. This charger operates off of a 12-volt car battery and will charge any four- to six-cell, 100- to 4,000-mAh nickel-cadmium battery safely and automatically. You simply hook it up, press a button, set the desired charging current from 0 to 4 amp hours and let the charger do the rest. The built-in ammeter and voltmeter allow constant visual monitoring of charge status. The charger has a delta peak automatic cut-off to ensure safe charges to 100% capacity.

I found this charger to be very easy and pleasurable to use. It consistently recharged the car battery from dead to full capacity in about 18 minutes.

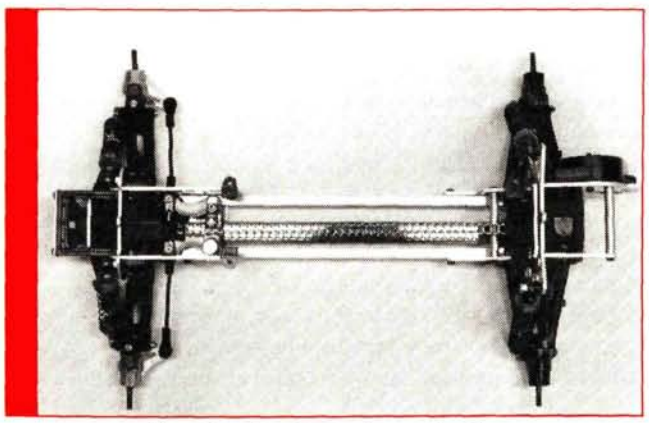
PERFORMANCE. Running the Optima is when the real fun begins. The car comes with two pinion gears (12 teeth and 15 teeth) to vary the car's speed/torque ratio. I used the 12-tooth gear almost exclusively to get the highest speed possible. I also advanced the motor timing 4°. The LeMans 480G motor accelerates the car quickly, and gives it a very fast top end. Motor runs were sometimes under eight minutes with the timing advanced 4°, so less advance may be desirable for competition races. The suspension easily handles rugged terrain and can absorb a 1-foot drop without a bounce. The steering is positive, even over rough ground. With its low center of gravity, the Optima corners very well with very little tendency to roll over.

The Kyosho Optima is an all-purpose R/C electric car. It's not only great for the fun-loving hobbyist who wants something to play with at the beach, but by adding a LeMans 480G motor and ball bearings, the Optima is a serious competition machine.

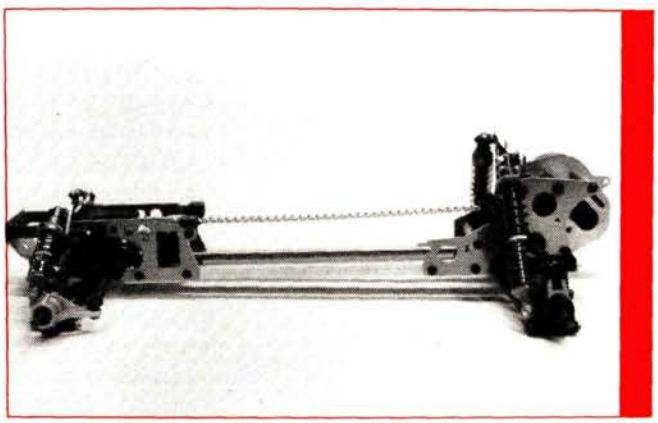
**The following are the addresses of the companies mentioned in this article:*

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Circus Hobbies, 3132 S. Highland Dr., Las Vegas, NV 89109. ■



Top view of main aluminum chassis.



Side view; note strong chain drive.

Watts Up?

by BOB SLIFF

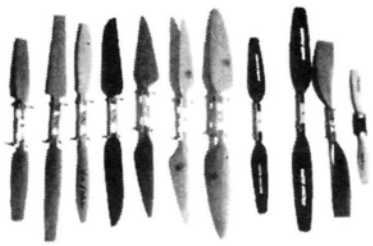
IN SOARING FLIGHT, a propeller adds a great deal of drag. This drag reduces the gliding ability, causing the model to come down sooner than if the drag weren't there. If you could drop the prop off, the drag problem would basically go away, but then you'd have lost props and no restarts in flight. As a compromise, you can fold the prop out of the way (mostly) and thus out of the airstream.

In order to accomplish this, several model-oriented companies have begun marketing folding props. Because it's much harder to make a folding prop in sizes small enough for direct-drive systems, most of them are aimed at the gear of belt reduced electric systems in the 05- to 40-size range.

These props come in various diameters and pitches and I've used most of the sizes offered with the exception of the largest 16-inch diameter sizes. The sizes I've found most appropriate are those in the 12- to 13-inch diameter range, which lend themselves especially well to the Astro Gear and Best drive units.

First on the list is a new 12x7 folder offered by the Midway Model Company*. It's a high-quality folder especially for the Astro 05 to 40 Challenger Cobalt geared systems. The blades are machined from Taipan 11x7 props which have been proven to be one of the best commercially available glass-filled nylon props for electrics. The 7x4, 7x6, and 8x4 are great for direct drive on the 05 and 15 systems. The center hub is machined aluminum and has a ¼-inch diameter hole at the center for the ¼-inch gear and Best unit shafts with no provision to stop forward canting of the prop blades. The hinge bolts are tempered steel 3 mm Allen cap screws (with an un-threaded shank so the blades don't ride on threads) and fiber lock nuts. Note that this hub can be used with Geist blades or any of the blades available through Ampere Flyer of Peter Bloomhart. A metric Allen wrench is included. The Midway prop is available through E-power oriented hobby shops or from Midway Model Company. The retail price is $12.95. In addition, extra blade sets or prop hubs can be ordered; blades, $7 a pair; hub, $7 each; hinge bolts with nuts and washers, $1 a pair; and metric Allen wrench, 50¢ each.

"Crash" Evanson launches his well-flown 650 Bugger that has gone through four motors and accumulated over 10 hours flight time.



Folding props for electrics come in various sizes and characteristics. Note dramatic differences in blade shape.

The Windsor Propeller Company* offers two Master Airscrew props, a 12x8 and a 16x8. While the 16x8 is a bit large, the 12x8 has proven to be a good choice for 05 and 15 systems in the 2:1 and the 2.5:1 gear ratios. This prop features a machined aluminum hub with 4-40 hinge bolts. The center hole is ⅛ inch diameter, so it will have to be drilled out to ¼ inch for most applications. If possible, use a step drill to do this to keep the hole on center.

The prop hub is cut to prevent any forward canting of the blades. Note that some forward canting of the blades is desirable so that gyroscopic precession loads on the prop and model will be reduced. The blades are molded glass-filled black nylon. This prop is available through hobby shops or from Windsor for $12.95.

The Robbe* folding prop is 14¾x12, making it too great a prop load for most systems. My Astro Cobalt 05 measured 35 amps on 7 cells, but cutting an inch off of each tip brought it down to a safe 24 amps, and it did a pretty good job of pulling my Electra. The Robbe blades are a medium-hard orange glass-filled nylon. The hub is machined aluminum with rather small metric hinge bolts and double nuts. It has a small center hole and will need to be drilled to ¼ inch for most reduction driveshafts. Like the Master Airscrew, it has a blade stop that prevents the blades from canting forward, but a small file can be used to relieve the prop hub. The Robbe prop is available from many hobby dealers for $14.95.

Probably one of the most talked about but least available props is one made by Fritz Geist of West Germany. It comes in two sizes but the smaller of the two (known as the Baby Geist at 13x7) is a good choice. The blades are of a high-quality epoxy-glass-filled laminate. They appear to be made by a hand layup process, similar to an epoxy-glass fuselage, and the finish on the blades is very good. The center hub is machined aluminum with a 5/16-inch center hole. The 3 mm hex-headed hinge bolts are made of tempered steel and have fiber lock nuts. Like the Midway prop, no provision is made to prevent forward canting of the prop blades. The Geist prop, in its original form, is imported by Wilshire Model Center*. A lower-priced copy can

be ordered from the Ampere Flyer* of Peter Bloomhart. The retail price from Wilshire is $21.50.

Finally, Tom Kerr of K&W Enterprises* is offering some specially made folders for electrics that are primarily meant for direct-drive motors, and are offered in separate parts. The hub (part #109), for electric motors only, is very finely machined and finished. The prop blades are a true hand layup long fiber-epoxy-glass laminate. Prop blades for this hub are offered in sizes 7x2.5, 7x3, 7x3W, 7x3.5W, and 8x4W. The hub sells for $15 and the blades are $8 a pair. They are available from hobby dealers or directly from K&W Enterprises.

Well that is most of the story on available folders. For those of you who want to give a gear unit a try on a sailplane, give one of these folding propellers a try.

Hints Department

"Crash" Evanson of St. Paul, Minnesota, has offered me a couple of easy and helpful ideas. Crash writes:

"Ever have a prop with its hole size too big to hang on to your Sporty Motor? Well, if the prop has a ¼-inch hole and fits sloppily on your prop adaptor, just snip off a short piece of fuel tubing and slip it over the prop adaptor stub. It's a tight but solid fit.

"Mounting your motor on the front of a 'made for glow' firewall can be accomplished quite easily. Use a plastic regular engine beam mount and a radiator clamp. A little foam tape should protect the motor and will also ensure a non-moving arrangement."

Announcements

Les Adams asked me to announce the formation of a new group in the Chicago area that is devoted to E-power. The group is called EMF of Chicago (or Electric Model Flyers of Chicago). Les says that all aspects of electric flight are welcome: scale, pattern, glider, or what-have-you. For additional information and particulars on meetings, flying sites, etc., contact either Larry Sperling 312-305-5165 or Les Adams 312-364-0660 after 6:00 p.m. CST.

The Boeing Hawks of the Seattle, Washington, area will be hosting their fourth annual All-Electric Fly-In on June 28 and 29, 1986. All forms of electric model aircraft are welcome. For those who need help, Mitch Poling will be conducting an on-field clinic. Entry

(Continued on page 86)

Jet Blast

by RICH URAVITCH

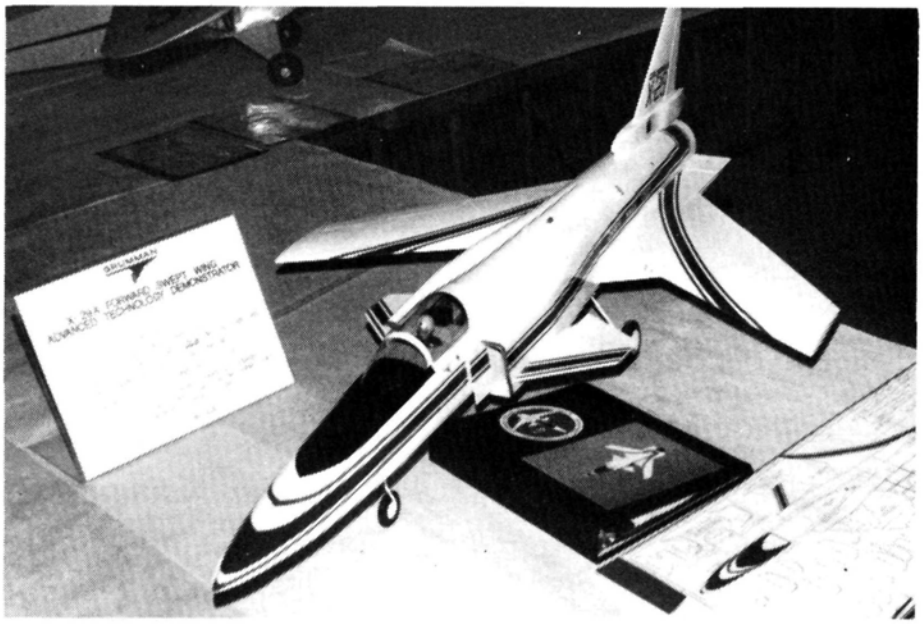
THE HARBINGER of Spring for a lot of East Coast modelers passed with the 1986 edition of the WRAM Show. Held annually in White Plains, New York, this gathering signals the imminent (and welcomed) arrival of the flying season and represents the first time many modelers have seen the outside of their workshops in months. Judging from the models on display in static competition, a lot of you have used your winter wisely.

Since ducted-fans are what this column is about, I'll fill you in on that portion of the activity.

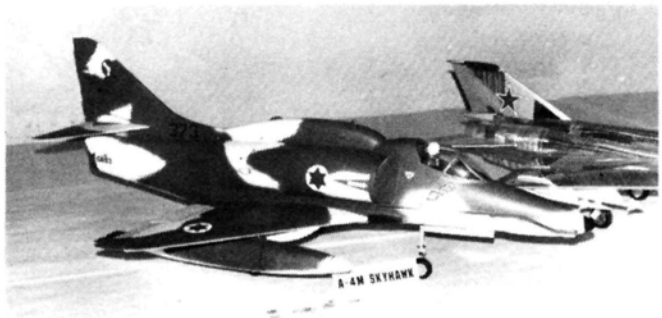
Tom Hunt returned this year with a follow-up to his Grumman F-14A Tomcat, a Grumman X-29 FSW Demonstrator. This cutie was smallish with 290 square inches of area in its 30-inch span wing. Among the innovative items was the coupling of the canard/strakes/and thrust vectoring tab in the tailpipe. Tom is using a prototype RK-720 fan unit with an O.S. 25 VFDF. At 4.5 pounds, the thrust-to-weight figures to be nearly 1:1. Two hundred hours were consumed building it, I suspect *after* the fiberglass fuselage mold was complete. Tom promised to tell me when the first flight will be made.

George Leu showed up with his Byron A-4 configured as an "M" with rework done to the nose and canopy area to make the outline more accurate. This airplane has always been popular among fan fans and George's version does the bird justice. Since I had built one some time ago, he and I spent some time swapping notes.

Mark Frankel was so distraught over the untimely demise of his first Lear that he built another one! The current version uses a pair of Dynamaxes with Rossi .65s. The new paint scheme duplicates the U.S. Coast Guard finish of grey, white, black, and red, and is very appealing, even more so, in my opinion, than the corporate variety. Knowing Mark, his first flight was probably as the last bit of snow was melting.



Tom Hunt's Grumman FSWX-29 with RK-720 is a unique and striking model.



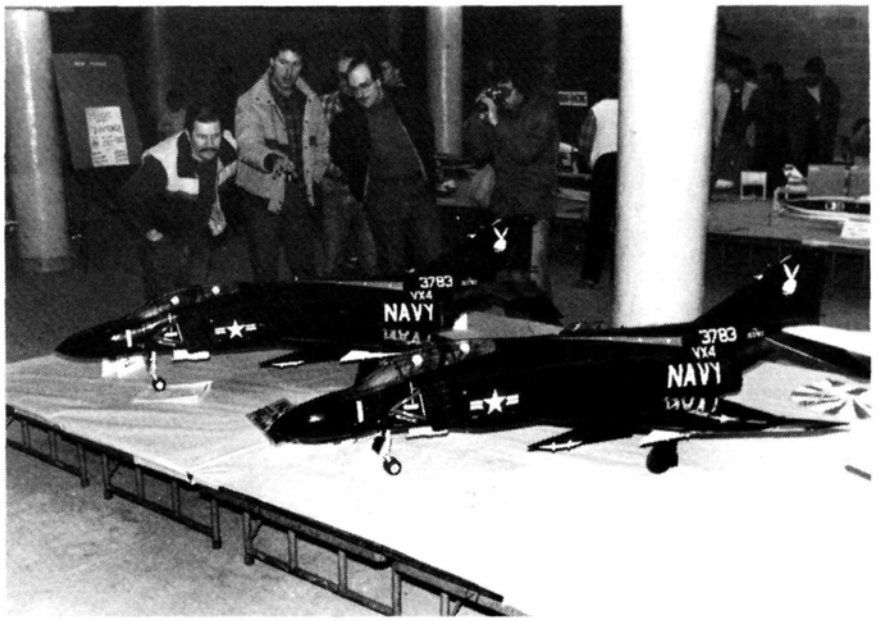
George Leu's well-executed Byron A4M in Israeli markings uses Rossi 81/Byrojet combo.

Mark Frankel's new Lear uses twin Dynamax/Rossi .65 combination.

Our old friend Timmy Farrell from upstate New York (near Kingston) was obviously busy. His scratch-built MiG-21PF took only seven weeks from start to finish. It tips the scales at 5¼ pounds and is powered by a Kress RK-740/O.S. .46 package. The porportions appear excellent and its Delta wing spans 30 inches with 400 squares. The burnished chrome MonoKote keeps the weight down and simulates the aluminum skin of the full-size bird quite convincingly. Tim says he is publishing the design, so plans might be available in the future.

Bobby Fiorenze showed up with a pair of Playboy Bunnies, the F-4s were nice also! Actually he built a second machine which is nearly identical to the one he's been flying regularly for *over* a year! He had them both on display and one awe-struck spectator was overheard saying he'd wait all weekend if they'd hatch "little F-4s." The quality here is superb, especially when you consider the amount of flying on the "old" one. Bob maintains his airplane in better shape than most of us build them originally. They both came from Tom Cook/Jet Model Products* kits and the new one will be powered by a pair of Cook's Dynamax fans.

Speaking of Tom Cook, this was the first time he had a booth at the WRAMs and I can tell you it was always crowded. His Starfire kit drew much attention and Tom was there throughout the show answering everyone's questions.



Bob Fiorenze's absolutely gorgeous Phantoms from Jet Model Products were winners at the '86 WRAMs.

The Byron Originals* army was performing a similar function, with most fan interest being shown in their F-20 Tiger Shark. The forthcoming F-15 Eagle was not on display, which no doubt disappointed modelers who had read about it and were looking forward to seeing it.

Kerry Sterner of Sterner Engineering* had a set of drawings for a huge F-18 Hornet. It's still in the works but I'll keep you advised. His F-80 and T-33 kits are doing well, with the video-taped grass field operation convincing lots of skeptics. Good news for you guys looking for an A-10—Sterner had a package consisting of drawings, wing cores, and canopy available for $25. It's just about 1/12-scale with a 58-inch span and uses a pair of RK-20s. Kerry is also flying an all-foam, Byrojetted, ½-scale BD-5J! Its all-up weight is 17 pounds with a wingspan of 8 feet, 6 inches. I'll show you photographs next time around. For peak performance...stay tuned!

Rich Uravitch, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Jet Model Products, 304 Silvertop, Raymore, MO 64083.

Byron Originals, Box 279, Ida Grove, IA 51445.

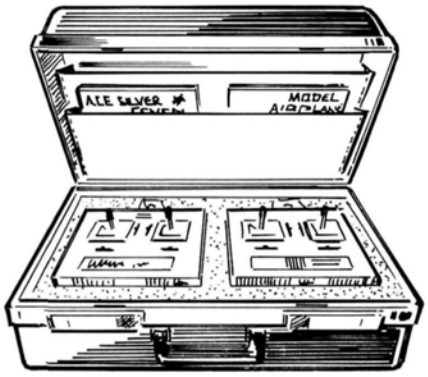
Sterner Engineering, 661 Moorestown Dr., Bath, PA 18014. ■

Tim Farrell's scratch-built MiG-21 used Kress RK-740 fan units and burnished Super MonoKote to effectively simulate aluminum skin.

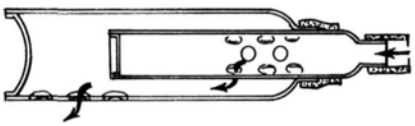
Hints & Kinks

by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

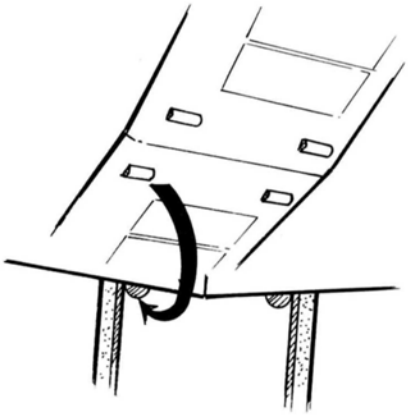


This gentleman really looks after his transmitters by way of a cheap attache case fitted with the foam packing in which his radio was shipped. Space is also available for a second radio or useful field accessories while the pockets hold the manual and perhaps a sandwich or two. Do remember, though, that peanut butter in the gimbals affects their centering... *Lindell Mulvany, Salem, Illinois*

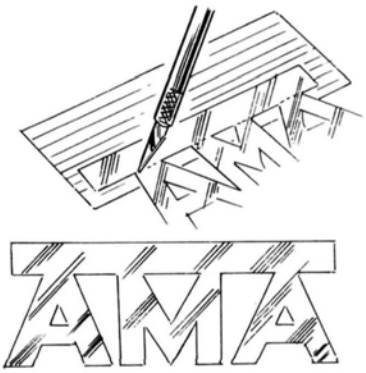


The empty metal cases from regular size and "jumbo" felt markers, when drilled and fitted together, make great mufflers for four-cycle engines. A sheet metal screw and silicon rubber sleeves hold all together nicely. Your columnist stands poised to purloin daughter's empty hair styling mousse container for his muffler! It will make a superb outer container. *Kjell Risholm, Breim, Norway*

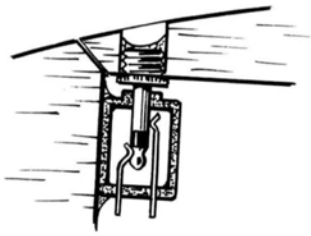
A setscrew, nut, and two large washers are all that are required for bending metal tube without putting a kink in it. Run the washer and nut down to the tube without pinching it, place the tool in a vise for convenience, then pull the tubing out and round to the desired curvature.
Bob Wiatr, Manchester, Connecticut



Here is an old free-flighter's trick for models with rubber-banded wings. Half-inch long pieces of split ¼-inch diameter dowel are glued under the wing as shown. In the lower view you can see that the dowels are snug against the inboard face of the fuselage sides. These dowels or keys center the wing every time, yet still allow the wing to slew if a tip hits. Obviously the wing is best centered and the keys glued in before the fuselage bottom is attached.
P.J. Turner, Agincourt, Ontario, Canada



Is keeping MonoKote or similar letters and numbers a problem for you? This builder recommends leaving a "bar" of material joining the characters when you cut them out. Place the bar of digits on the wing, then iron up to near the top. Slip an index card under the bar, then with a rule and new blade, neatly slice it off before completing the ironing.
Raleigh Dean, Marshalltown, Iowa



Use one or two small phone jacks as necessary to hold your hatch or canopy. Cut off the unwanted solder tabs, then use epoxy or cyanoacrylate to set the units in place. For big canopies, use larger jacks for more holding power.
Anil Narwani, Port-Of-Spain, Trinidad, West Indies

Byron Originals CORSAIR

by GEORGE WENDT

BYRON ORIGINALS* has added the Corsair to its family of fine kits—and what a beauty she is! Byron's reputation for quality is well deserved and second to none, so I was confident that the Corsair would live up to her family name.

THE KIT. The Corsair arrived in three large, well-packaged boxes. There was no damage at all. I spent a long time going through the assorted bags of hardware and, to my pleasure, discovered that nothing had been left out. The kit came so complete that the only items needed to get her flight-ready were the "Purr Power" unit, the Quadra* Q50 engine, the Robart* 180° rotating retractable landing gear, and paint. Be sure to order the gear at the same time as your kit since you'll need the landing gear to install the wing spar at the right locations. A complete finishing kit can be ordered from Byron.

I took two days to carefully go over the plans and owner's manual. There isn't any particular part of constructing the Corsair that was difficult, but you should be knowledgeable in model building before attempting the job.

CONSTRUCTION. I began construction with the fuselage former F-2, then drilled three

From out of the Pacific campaign flies this magnificent 1/5-scale legend.

holes in F-1 at the marked locations and installed the 8-32 blind nuts. I then located the F-2 front fuselage wing spar former and drilled them also. Constructing the plywood muffler cap for the backside of F-2 went smoothly as directed in the plans. Next I located F-3 and the two aluminum extensions and installed them in their proper locations. When these tasks were complete, I cut out the wheel well doors with a zona saw.

Installation of the two wing spars was next. Close examination of the leading edge revealed the location marks for F-2. I drilled three 1/16-inch holes at the marks and threaded wire through them. Once F-2 was in place, I added the glue.

The next task was to locate the landing gear rails. When this was done I installed the Robart gear unit to the rails and trial-fitted each gear unit into the wing and also into the notches of F-2. The wheels need to turn toward the wing tips during rotation. I engaged the landing gear in the front notches of F-2. It was then time to slide F-3 into position and to engage the rear ends of the rails. I manually cycled the landing gear a few times to make sure they operated smoothly. Once I was convinced they were properly installed, I cut 2-inch wide strips of the fiberglass cloth provided and completely covered F-2 and F-3.

The next step was to add the aluminum angle cowl mounts to F-1 and install them. (At this point be aware that if you aren't going to add flaps, 1/32-inch plywood stiffeners are needed and directions for accomplishing this are in the plans.)

Next I began work on the tailfeathers. Using the template provided, I marked all cutouts and the correct locations of the 3/8x3/4x5-inch maple tailwheel blocks. With Satellite City* super glue I attached them to the backside of the rudder post as in the drawings. I then installed the D&B retract unit and

(free Corsair poster next page; text continued on page 72)

SPECIFICATIONS

Type: *Giant scale*
Scale: *1/6*
Wingspan: *85 inches*
Wing Area: *1,230 square inches*
Length: *68 1/2 inches*
Channels: *5*
Engine: *Q50*

photo by GEORGE WENDT

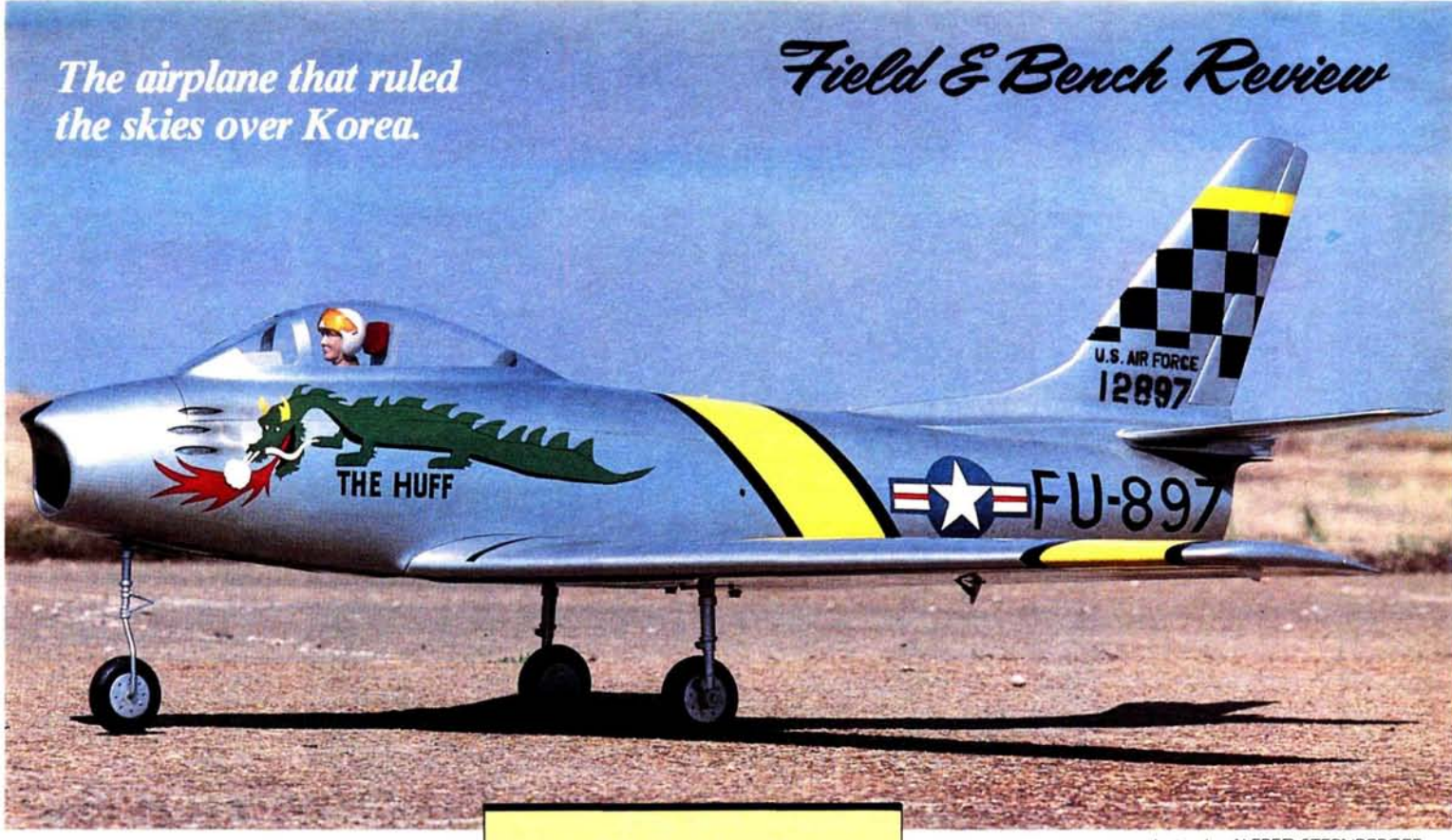
F4U

ORSAIR

photo by BUDD DAVISSON

The airplane that ruled the skies over Korea.

Field & Bench Review



photos by ALFRED STERNBERGER

Jet Hangar Hobbies F-86 Sabre Jet

by KENNY PERKINS

THE TWO most important considerations in selecting an R/C kit have to be ease of construction and performance. Well, how about a ducted-fan model of an F-86 Sabre or its Navy brother, the FJ-3 Fury? "A ducted-fan?" you say. Before you tune me out, hear me out.

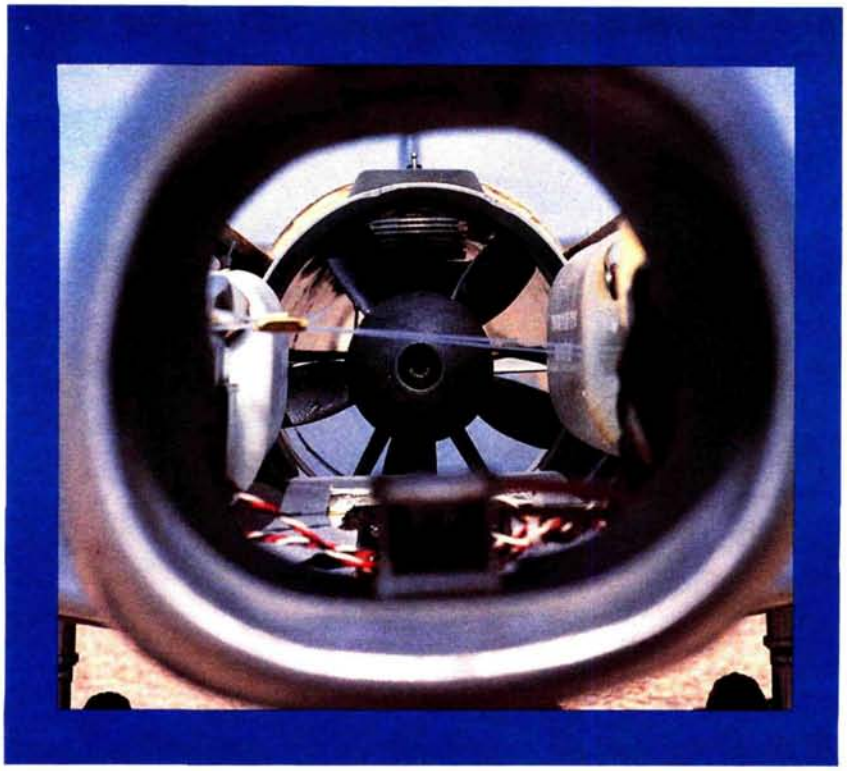
I'm talking about easy building and flying with performance ranging from one end of the scale to the other, from slow walk to warp three. This is accomplished through the use of a modified flat-bottom airfoil, a great kit, and simplified building techniques. Jet Hangar Hobbies* has really outdone themselves with this presentation, which has been added to their already impressive line of ducted-fan models.

The F-86/FJ-3 kit is available in three different stages of completion: a semi-kit which includes a fiberglass fuselage, foam wing cores, canopy, construction booklet, and three sheets of full-size plans that include templates for all wood parts and painting stencils; a complete kit which includes all of the above plus machine-sawn wood parts and a fiberglass tailpipe liner; and finally a complete kit which has a fan unit. You make the choice of fan, either the Turbax I for .45-size engines or the Turbax III for .65-size engines.

There are actually three stages of top-end performance available. First, you can use the Turbax I with the K&B 7.5cc engine or another similar ducted-fan engine. Second, you can use the Turbax I with the K&B 7.5cc engine with the update kit, which is

SPECIFICATIONS

Type: *Ducted-fan jet*
Scale: *1/9*
Rotor Span: *50 inches*
Area: *550 square inches*
Length: *50½ inches*
Weight: *8-9 pounds*
Engine: *Rossi .65, Turbax III*



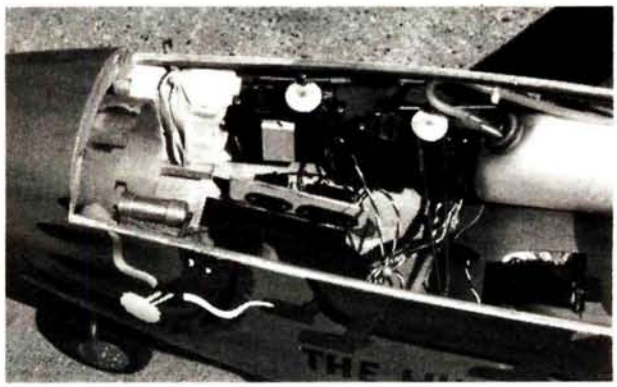
Looking down the throat of the Sabre you can see what makes it go, the Turbax III from JHH.

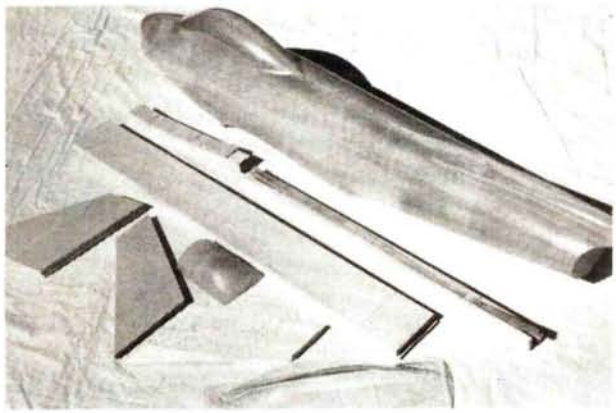
Top: Convenient access to all systems. Middle: A partial view of the kit shows flawless fiberglass fuselage. Bottom: Rhom Air retracts are perfect for this setup.

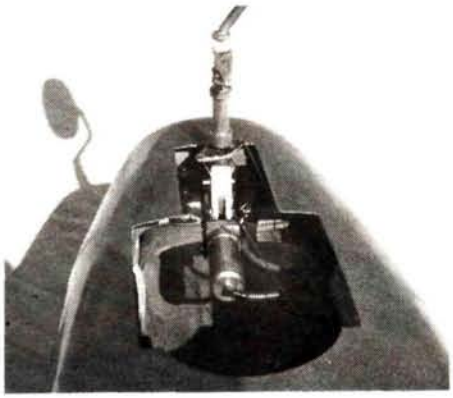
available from Jet Hangar. This setup gives you a 2,000 to 3,000 rpm increase over the stock engine. Third, you can use the Turbax III with a Rossi, K&B, O.S., or similar .65-size engine.

The performance difference between the 7.5 with update and .65 engines is smaller than you'd think due to the fact that the .65-size fan and engine weigh almost a pound more than the smaller unit. So no matter what your choice of kit, fan, and engine, I don't think you'll be disappointed.

THE KIT. Upon opening the box you'll find that everything is well-packed to prevent shipping damage.





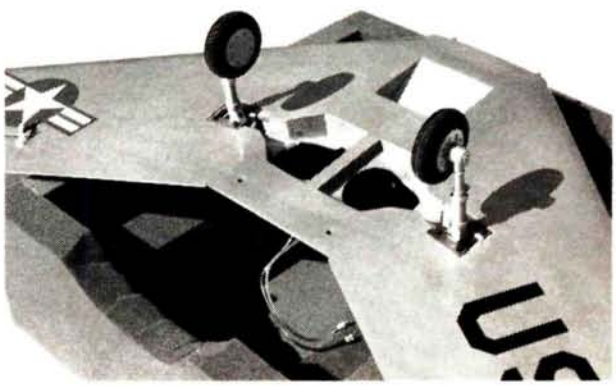


Rhom Air nose gear setup used to advantage.

The small wooden parts are packaged in plastic bags and are stapled to the side of the box, and the larger parts are also amply protected from shipping rash. The foam wing cores are all cleanly cut and of good quality. The fiberglass fuselage is of first-class quality; light with very few pin holes.

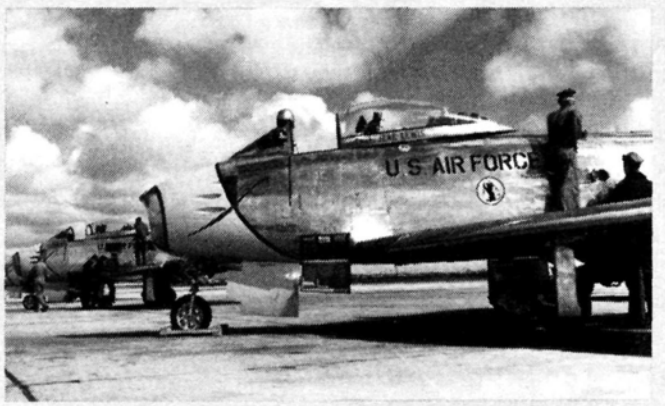
One thing to keep in mind during construction is weight. It should be a primary concern when building this or any R/C model. The old adage, "If a little bit is good, a lot must be better," doesn't hold true when using glue or paint. I suggest using 30-minute epoxy

(Continued on page 114)



M.A.N. file photos

THE MOST famous U.S. fighter aircraft in the 1950s was without a doubt the F-86 Sabre. The F-86 was a product of North American Aircraft Corporation's design engineers, who had already made a name for themselves with the P-51 Mustang. At the end of 1945 the staff at North American was among the first to put into practice material obtained in Germany concerning the design of a swept-wing, jet-powered fighter. On October 1, 1947, the first prototype XP-86 took to the air. So impressed were Air Force observers that they placed an order for 33 production P-86A Sabres. The order was later upped to 221 and then 554 machines, powered by the General Electric J47-GE-1 engine.



The first model of the P-86A flew on May 18, 1948, and on September 15, 1948, established a new world speed record of 670.981 mph. Production was pressed due to the need for an advanced fighter for pilots struggling in the Korean War, and delivery was made to fighter units as soon as it arrived in Korea. On December 17, 1950, the Sabre completed its first war mission, and also its first kills, destroying four MiG-15s in a sweep of "MiG alley."

The primary adversary of the F-86 Sabre in the Korean War was the Russian-built MiG-15. In the hands of proficient pilots, the MiG was a formidable foe. Able to out-climb and out-turn the Sabre, the MiG also had a higher ceiling capability and was nearly as fast. Where the Sabre weighed in at over 18,000 pounds, the nimble MiG was a scant bantamweight at just over 11,000 pounds. This gave the MiG a rate of climb and ceiling capability that the Sabres could not match.

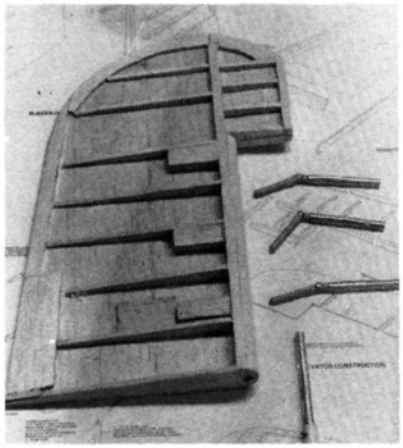
The difference was in pilot training and aircraft armament. The Communist air arm had a few excellent pilots, but for the most part the MiGs were flown by low-time aviators with little or no combat experience. Lieutenant Kum Suk No, who defected with a MiG-15 to Kimpo Airfield in 1953 and was promptly awarded a U.S. American Express check in the amount of $100,000 stated, "But for the sheer superiority of the American Sabre, I'm sure the Korean War would still be going on today." This statement is borne out by the fact that during that period 827 MiG-15s were shot down, while the loss of F-86s was only 78.

On July 27, 1953, the Korean War officially ended. If there was ever a question of who ruled the skies below the 38th parallel for three years between 1950 and 1953, it would have to be the North American F-86 and the pilots who flew it. ■

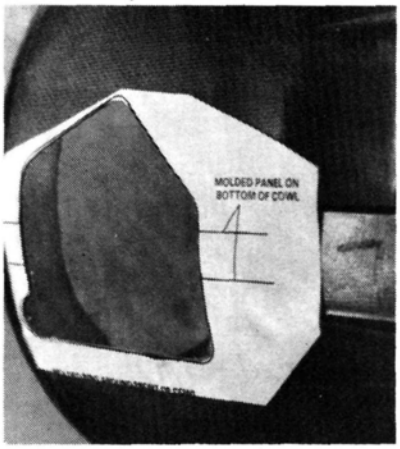
Byron Originals

CORSAIR

(Continued from page 65)

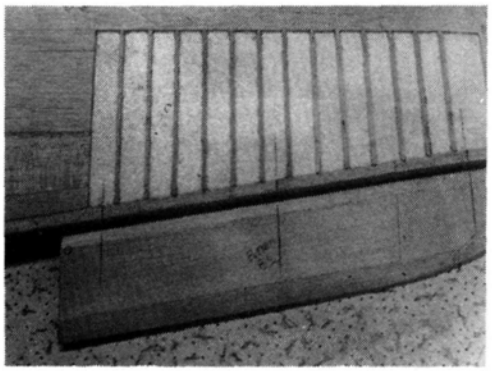


Stab is built in a clever way to duplicate fabric-covered surfaces.



Pattern is provided for cutting out hole in cowling for engine.

Molded parts, such as the wing oil cooler inlet ducting, make the job very simple.



Portions of the wing on the full-size Corsair were fabric-covered and are duplicated on the model with false ribs for that effect.

added scrap ⅛-inch balsa to stiffen the hinge location. Adding ½-inch balsa served to fashion a hinge anchor. Following the panel lines on the fuselage, I removed the gear doors and put them aside for the moment.

Next I installed the rudder bellcrank to the rudder post and tack-glued the rudder post in place. Once I had that done, I joined the front and rear fuselage sections together. I found some 80-grit sandpaper to be effective in roughing the areas that were to be glued. Using several 2x⅜ sheet metal screws to temporarily hold the tail section in place, I applied 30-minute epoxy. Once the epoxy had cured, I removed the screws and filled the holes with Hobbypoxy* Stuff.

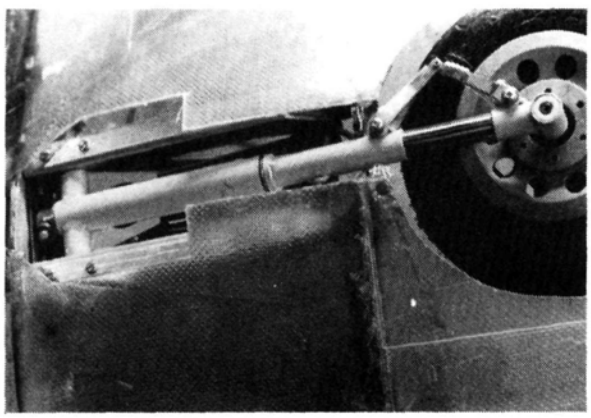
Constructing the outer wing panels of the Corsair was different from Byron's other warbirds. The wing panels of the F4U-1 Corsair consist of wire-cut foam cores covered with 3/32-inch balsa sheeting which simulates wing ribs. I glued the plywood spar to the aluminum spar and when the glue had dried I inserted the aluminum spars into the extensions bolted onto F-3 and locked them in position by tightening the 10-32x¼ socket head bolt.

The time had come to put the fuselage on my workbench and to make two dihedral jigs, 4¼ inches high at the wing tip, and to slide the foam wing panels in position on the plywood and aluminum spars. Using slow-drying epoxy, I glued the plywood spars to the foam wing cores. Once that was dry, I removed the outer wing panel cores.

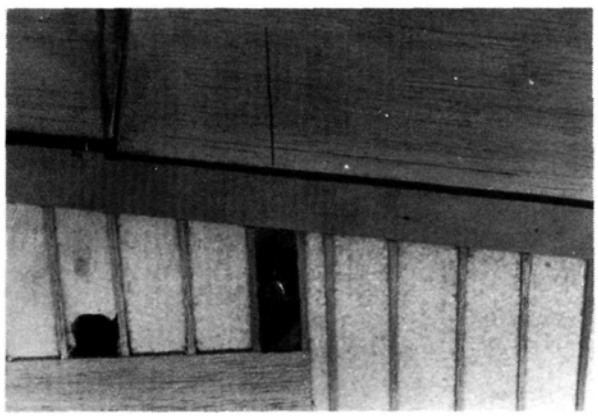
Next came the wing panels. Here, the construction methods of the Corsair again differed from Byron's other warbirds. The wings are sheeted with 3/32-inch balsa wood and the wing tips are made of fiberglass. Once both wing panels were sheeted, I installed the ailerons and flaps. I removed both ailerons from the wing panels and marked 3 inches ahead of the trailing edge of the control surface. I cut the remaining portion off. Adding the ½-inch leading edge and shaping it completed the ailerons.

The next area was the flaps, and I was more than a little apprehensive about this task. Before cutting the fiberglass center section, I read Byron's instructions to the point of memorizing the steps. I really had to work up enough nerve to do the cutting of the flaps. All my worry turned out to be needless because, by carefully following the plans, I was able

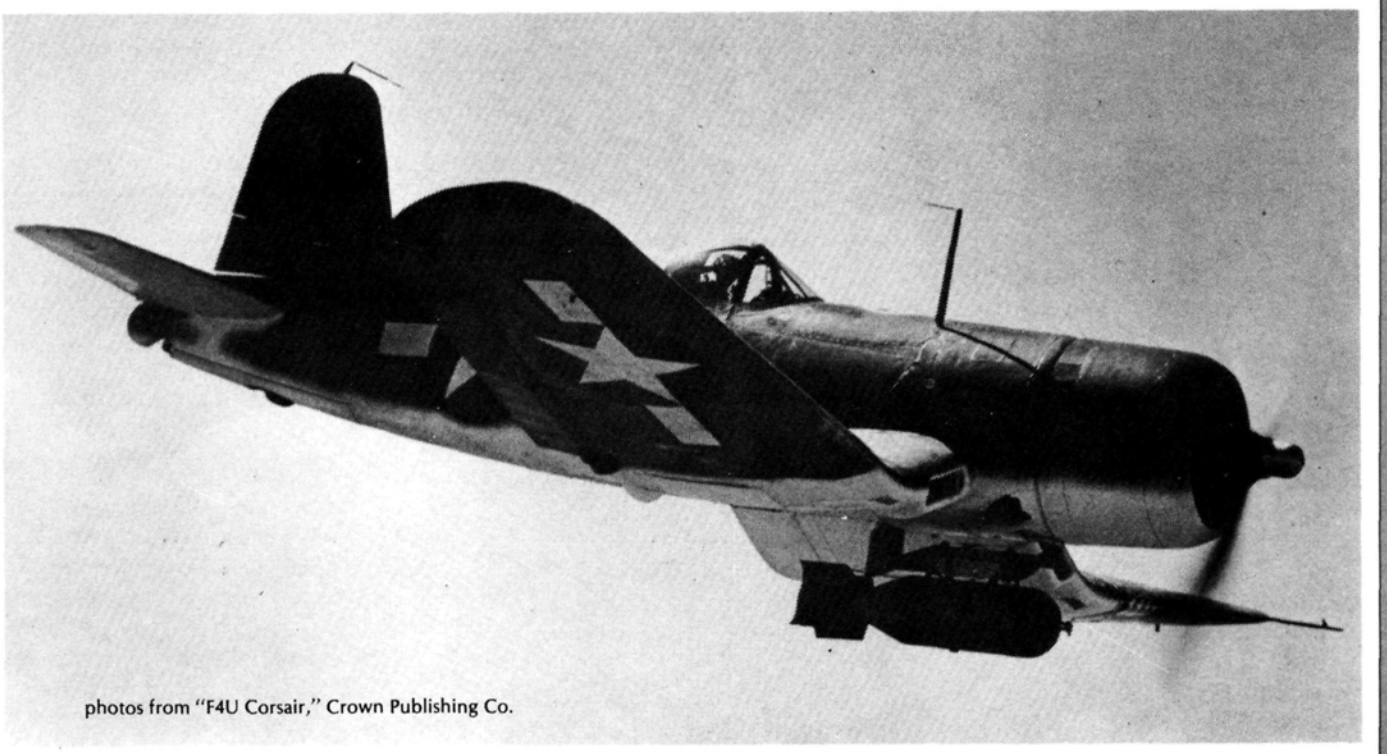
(Continued on page 112)



Byron's rotating main gear is a scale modelers' delight.



Aileron counterbalancers take some load off the servos and help prevent flutter.



photos from "F4U Corsair," Crown Publishing Co.

THE VOUGHT F4U CORSAIR was one of the first fighter planes to give American forces a tactical edge in the Pacific during WW II. Designed around the massive Pratt & Whitney R-2800 Double Wasp radial engine, the Corsair had obvious unique features to accommodate the more than 2,000 horses available. The most noticeable feature was the inverted gull wing to ensure that the huge propellers would clear the ground.

The first prototype Corsair didn't fly until May 1940. Design work on the airplane started in early 1938 in response to the U.S. Navy's request for a shipboard fighter that could match performance with the best of the current land-based pursuit aircraft, and still operate from an aircraft carrier.

On May 29, 1940, the first Corsair XF4U-1 took to the air over Stratford, Connecticut, with test pilot Lyman A. Bullard, Jr. at the controls. The flight was not without problems. Bullard stated that the controls fluttered badly, although he was still able to control the aircraft enough to land. The second flight was not exactly trouble-free either. Boone Guyton, another Vought test pilot, ran low on fuel when storms blocked his way back to Stratford. Not wanting to test the glider qualities of the bent-wing bird, Guyton powered the Corsair down to a Connecticut golf course and set up for a carrier style landing. The rain-soaked fairway proved too slippery to stop on and the Corsair swapped ends several times and then flipped over, coming to rest after slicing through a stout tree trunk that finally halted the fighter. Although it was extensively damaged, Vought rebuilt the craft and on October 1, 1940, the Corsair flew at a speed of 404 mph. The Navy had a new fighter, although the first production model, the F4U-1, wouldn't reach service units until late 1942.

Along with Vought, Brewster Aeronautical and Goodyear Aircraft were contracted by the Navy to build Corsairs, and production of the aircraft continued until

1952 when the last version, the F4U-7 was delivered by Vought to the French Aeronavale. During the ten-year production life of the Corsair, many changes were made to the aircraft by way of engine, control systems, and armament, but the basic design remained nearly the same. Nearly 6,000 Corsairs were built and they were subjected by the Navy to combat roles all over the Pacific in WW II. It was put into service again during the Korean War, serving up to the final day on June 27, 1953. The sturdy fighter continued serving foreign governments for many years after that.

It can be said that the Corsair proved to be one of the most successful fighters in history, and can still be seen flying the skies over many major airshows and in Hollywood productions. Its only mission now is to be an example of a period in time when American fighting forces proved that we were the best there was, and Corsairs will be remembered with respect and affection by those who flew them. ■

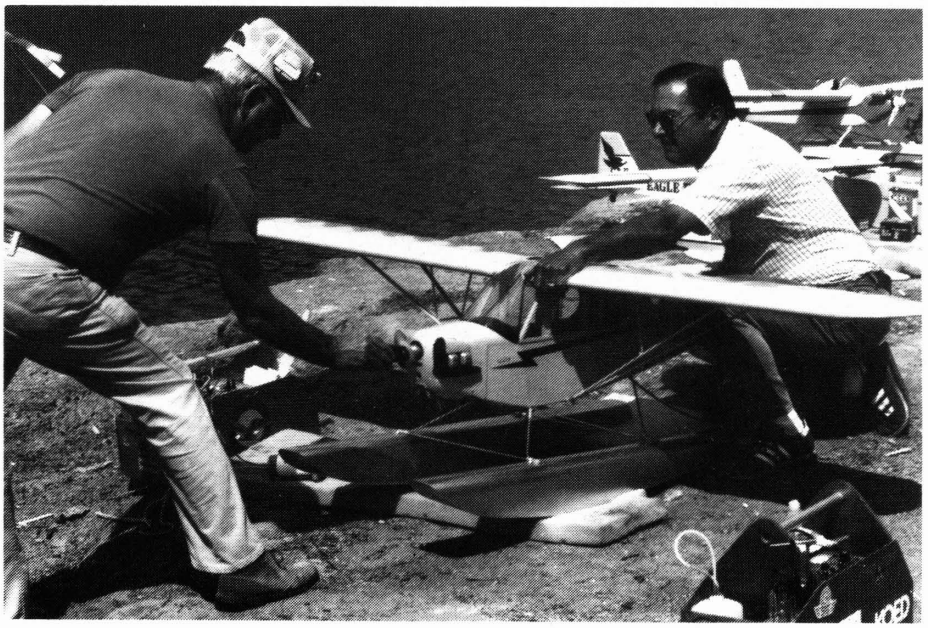
Floating Around

by JOHN SULLIVAN

IF YOU TELL someone you fly radio-controlled planes on floats, you can be sure of one of three responses. A non-modeler will think you're fibbing, a modeler who hasn't seen it done will think you're crazy, and a fellow float flier will greet you like a long-lost brother. It's the second one, the modeler who hasn't witnessed the spectacle of flying off water, that I'd most like to reach here.

Judging from the mail I've received, one of the major concerns of a first-time float pilot is the degree of water protection he must provide for the plane and radio gear. I've included a photo of Bill Curry's Schluter Superior, taken shortly after a perfect inverted hover and landing, to illustrate the effects of total exposure. When taken from the water, the Superior's gyro was still running. The radio unit was switched off and the chopper rotated to drain water from all areas.

At this point the body shell was removed, the throttle was manually set to start position, the plug was removed, the engine flushed with raw fuel, the plug reinstalled, and the engine started and run for 5 minutes. Later in the day, Bill took the Superior home, blew off the mechanics, and sprayed them with WD-40. (If you don't have an air compressor, you might stop at a service station on the way home.)



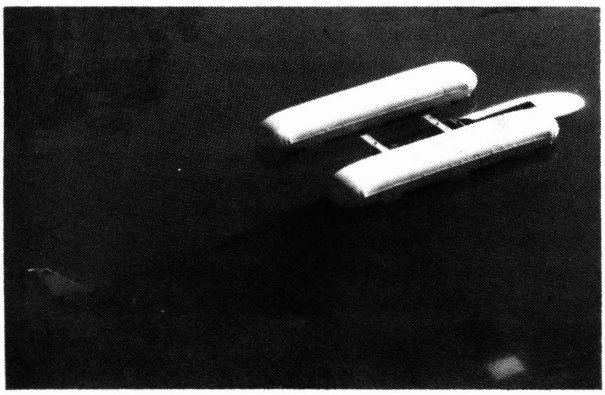
Dick Lemme tachs his O.S. 120 four-stroke while George Graff holds. Note foam pad under floats.

In this case the entire airborne pack was unprotected, so it was necessary to open the various cases, flush the interiors with alcohol, blow them out with lung power, and set the gear aside in a warm spot to dry completely. The next morning, Bill reassembled the Superior, put it on a quick charge, and, after a range check, flew the chopper late in the afternoon.

That spill occurred more than two months ago and the Schluter is still performing flawlessly.

It's important to note that with winged aircraft, total submersion rarely, if ever, occurs. After four years of flying off the water exclusively, our club has arrived at the following consensus for water protection: the battery is easily protected by wrapping it in foam, with a plastic baggy over that, and taped around the lead. If you have the type of receiver with leads emanating from the case, you can protect it the same way, but if not, we've found the best protection for it, and the servos, is to mount them in a central area of the fuselage. That way the equipment will only be splashed and not submerged should water get inside.

As far as the airframe goes, we suggest a silicone wing saddle, splash hoods over pushrod exit areas, and a polyurethane seal over all covering seams. It's also prudent to coat the fuselage interior from the trailing edge forward with one coat of polyurethane.



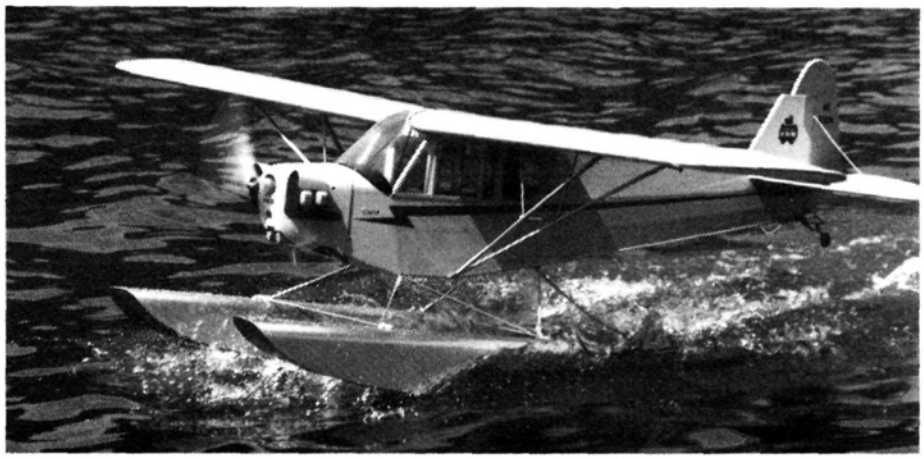
Schluter Superior in inverted mode. See text for important water-proofing info.

Note that all of the above relates to flying off fresh water. I'm not well versed on electronics, but I have visions of radio gear in salt water that look something like an arcing electrical storm on Mars. Maybe some of our readers can shed light on the salt water issue. Drop me a note and I'll put it in. *(Carry a bucket of fresh water! DBS)*

Floating Cub

Next up I have a couple of photos of Dick Lemme's ¼-scale Sig Cub on floats. Dick is a highly dedicated modeler who has built over 200 planes in his career and who has flown everything from stick-and-tissue, to pylon, to giant-scale biplanes. The Cub was originally built as a land plane and later converted to floats after Dick heard of our activities.

The Cub is powered by an O.S. 120 four-stroke, installed inverted, and the radio gear is by Futaba. The 48-inch foam floats were cut by Bill Gresham of Clearlake Oaks, California, who is one of the masterminds behind the annual Clearlake Float Fly. (Incidentally, last year's meet brought in over $3,000 for the Statue of Liberty fund and will be held on May 10 and 11 this year.) The floats have a 1x¾-inch redwood strong-back imbedded in the top and are covered with 1/16-inch balsa and 2-ounce fiberglass cloth. Dick installed a single kick-up type rudder on the left float, which steers the big Cub with authority.



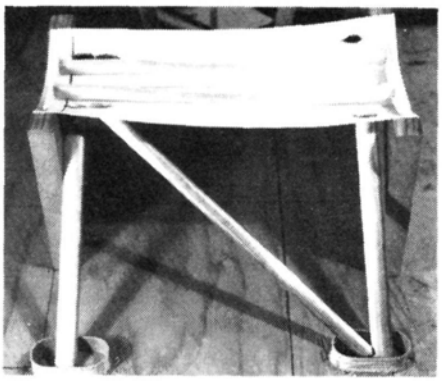
Dick Lemme's gorgeous Cub heading out. Note up-elevator for displacement planing and rudder for right turn.

At the final weigh-in, the Cub hit 15 pounds total, with floats. The 120 four-stroke can yank the plane off the water with ease in 40 feet, but it's the long 200-foot runs with the water dripping off the floats at takeoff that send shivers down your spine. This is just one heck of a fantastic combination, and, after 40 years of modeling, Dick says it's the biggest kick he's ever had.

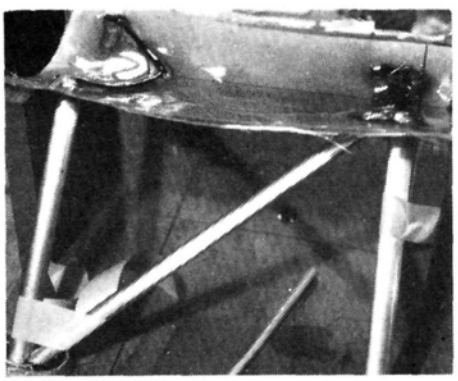
Gee Bee E

The next group of photos are of Mike Johnson's current project. Mike is adapting a set of floats to his Coverite Gee Bee E, and his solution to the problem of mounting float gear to a low-wing airplane is worth looking at. Let's take a look at the problem first. First, the wing must be removable for access to the flight pack and gas tank. Second, the strut

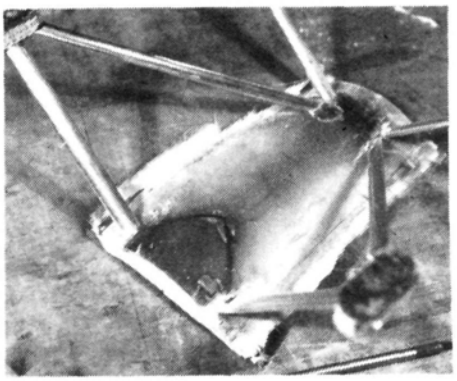
(Continued on page 110)



Jig setup used for Gee Bee E float struts. Forms for feet are from inner tube repair kit.



Strut assembly after first pour. Note music wire stiffeners glassed to belly pan.



Finished assembly prior to trimming.

Offshore

by JOHN OIAN

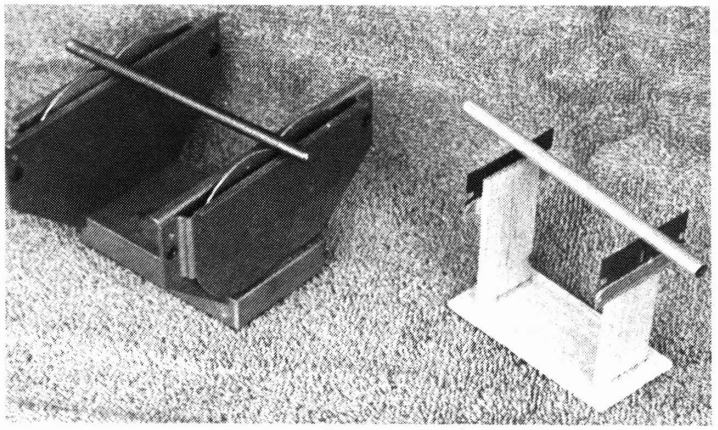
THE PROPER FINISHING and balancing of a boat propeller can probably add more miles per hour than just about any other single factor in R/C boating. I've seen the performance of a boat go from barely running to super with just a relatively minor change in the leading edge shape of a prop. This is an extreme of course, but a little time spent in this area can really help. Like any other job, the task will be a much easier one if you start with the proper tools. The methods and materials mentioned here are the ones I find easiest to use. They aren't the only ones, however, so if you have a better way, use it and then tell me about it so I can share it.

The best tool I've found for shaping and balancing a propeller is a sanding disc on a hand-held Dremel tool. A large, coarse disc will make work a lot easier and I've found the Power Lock sanding discs to be very good. One word of caution; because of the large size of these discs, you shouldn't run them too fast. Keep the rpm down.

Another good tool is the Dremel belt sander. Be careful with this one too; it cuts fairly fast and might cause grooves in the prop. For fine finishing I use wet-or-dry sandpaper or fine Dremel sanding discs. You'll also need some safety glasses *(very important)* and a filter mask. Props contain beryllium, which is a toxic metal in both particle and vapor form, so use a mask and work in a well-ventilated area. A pair of good heavy gloves is also a real plus. These props get very hot while being worked on with power tools, and they can cause a nasty cut if they get away from you.

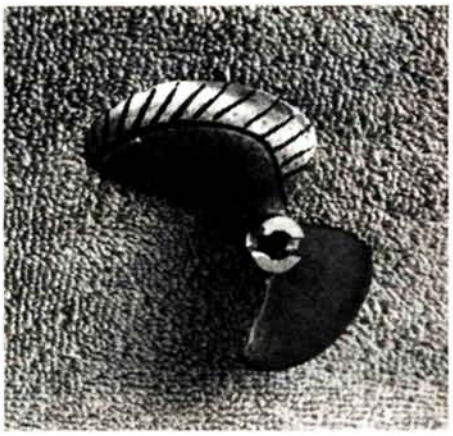
You'll need a balancing stand of some sort. High Point Manufacturing makes a very good one, but you can build one yourself with a couple of single-edge razor blades and some balsa pieces. If you use this type, be very careful where you put it. I've seen some nasty cuts from people accidentally setting their hand on one.

Dremel tool with handy Power Lock sanding disc, a valuable tool for reworking metal props.

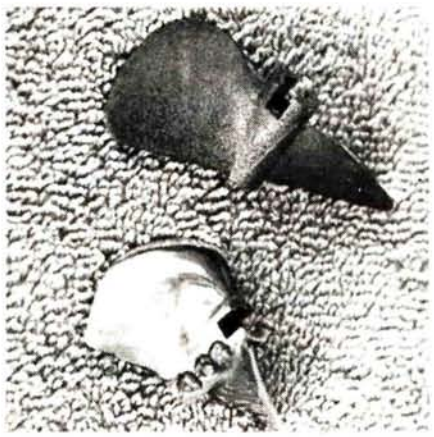


Two prop balancing jigs, the one on the left is from High Point Manufacturing and the one on the right is a do-it-yourselfer.

So now that you have all this stuff, what are you going to do with it? A metal prop should be balanced and its leading edge sharpened. These two tasks are done at the same time. Of the two, balancing is the most important. A dull unfinished prop will not perform 100%, but one that's out of balance will be a disaster. An out-of-balance prop will ruin your radio and shake your boat apart due to vibration. It will also destroy your prop end drive line bearings, especially on the K&B outboards. Due to the idiosyncracies of the casting process, it's impossible to come up with a truly balanced propeller; and at the rpm we



An unfinished Octura 2.2 prop showing area to be reworked.



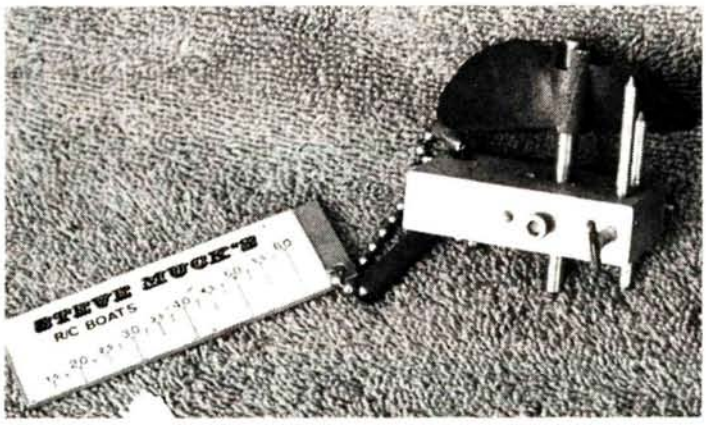
Raw prop in background and finished one in foreground.

run, an out-of-balance prop will create an unbelievable vibration.

When sharpening and balancing a prop, there are only two areas of the prop where you'll be working. The forward facing one-third of the leading edge of the prop is the first area and is marked by black lines in the photo. The other area that might have to be trimmed is the heavy side of the hub if the hole is drilled slightly off center (it can, and does, happen). Never remove material from the surface of the prop that faces the rear of the boat, because this will change the pitch of the prop.

Start by sharpening the leading edge, working only on the leading one-third of the blade. Remember to remove material only from the forward facing surface. When you have this area roughly shaped and fairly sharp, put the prop in the balancer and see what you get. Chances are one blade will swing down. In that case remove a little more material from the worked area of the heavy blade. Work only the area of the blade that is hanging straight down; it may be near the center, or on the tip. Keep at this until the prop will stay wherever it's put in the balancer without swinging one way or the other. Sometimes you can get an idea

(Continued on page 104)



Steve Muck's very handy prop pitch gauge.

Giant Steps

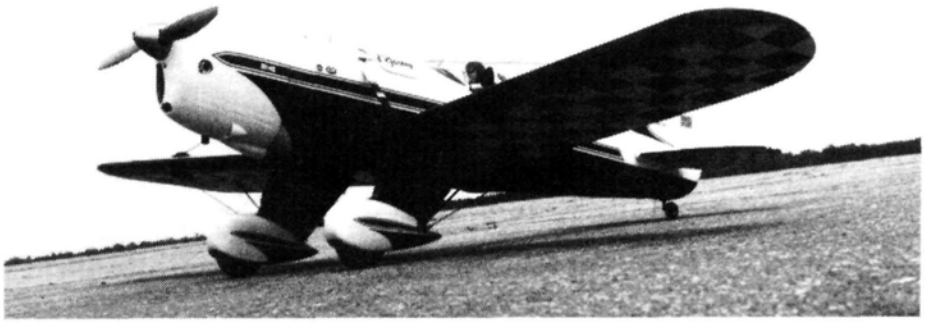
by DICK PHILLIPS

WHEN DARIO Brisighella of U.S. Quadra* tells me a product is good, I believe what he says. I've known Dario for quite a few years and I have complete confidence in his opinions. If a product is no good, he won't carry it.

Dario is selling a new gasoline additive, called Metalon, for large engines. There are two varieties: one called Metalon M and the other Metalon 2-4X. Dario is enthusiastic about these additives, which is a bit of a departure for him. About most additives he says, "If you want to make the supplier wealthy, use 'em; if you want to improve engine performance, forget 'em." That's always been good enough for me; I have enough trouble affording all the things I already do.

Metalon comes from Canada and Dario says it reduces engine wear, prolongs engine life, and improves performance. Now that's for me. In addition, you don't have to start using this stuff the day you buy your engine. It has salutary effects on old engines, new engines, and all those in between. If there is a panacea for all the ills of engines, Metalon is a good place to start. There is no cure-all for everything, but this product has the stamp of approval of one of the real "experts" on two-cycle engines. Dario has written the book (literally) on two-cycle engines, and he knows whereof he speaks.

Generally speaking, additives don't stand up to their claims. It has been my experience that you can add all sorts of exotic things to your fuel and the best that can be said for most is that they increase the cost of operating the engine, they usually don't improve performance much, and the few that do cause an improvement exact a cost in return. If you've ever played around with hopping up engines, you know that every little bit you force out of that engine takes away some of its useful life. Everything you squeeze out of a mechanical device has a price over and above what it actually cost to extract that little extra bit.



Burnis Fields' latest addition to the giant-scale scene is the absolutely gorgeous Ryan STA in Gosney markings featured in last month's M.A.N.

I guess I'm pretty conservative and I usually adhere pretty close to what the manufacturer suggests. That's not to say I won't experiment with something new, but I tend not to try and force things beyond what I have a legitimate right to expect. I build airplanes that can be flown on the engines available in my arsenal, and I build things at the right weight level for the engine I plan to use. This saves a lot of trouble and makes airplanes last a lot longer than if they were roaring around on the edge of disaster all the time.

Graupner Chinook

Near where I live is a firm that makes a rather nice little ultra-light. It's called a Chinook and it's available as a one- or two-place, closed-cabin model. I've had a ride in one and found it to be quite an impressive little machine.

Now I'm working on a model Chinook from the Graupner kit imported by Hobby Lobby International*. It's a typical Graupner kit, and if you don't know what that means, you should try one. They are very nicely made and this one is quite complete if you buy the accessory kits available. By my standards, it's small—at least smaller than I usually build—and it would be an ideal candidate for a four-stroke engine. The wing is built-up and the fuselage is almost an ARF kit in itself. If you like building wings and don't care much for building fuselages, boy, have they got a deal for you!

If you need an excuse to buy a four-cycle engine, the Chinook could be the justification you need. It's quite close to scale and Bob Banka of Scale Model Research* will have documentation photos for it as soon as I get them done and sent off to him. It's a nice scale subject as the minimal instrumentation and detailing would make a good model (if well done) without acres of panel details and cockpit finishing work.

The full-scale version is built by Birdman Enterprises of Edmonton, Alberta, Canada, and is a very well-designed machine. It's a three axis control machine using a sort of wing warping although an aileron model is in the design stages. It has a number of options available, in-

The Chinook is a simple design ultra-light and the subject of a kit by Graupner from Hobby Lobby.

cluding a choice of Rotax engines, and can even be equipped with a parachute to let you down easy if you happen to get into trouble. Both the model and the full-scale look great with some very colorful designs incorporated into the decor.

I'm looking forward to finishing the model Chinook and to flying it this season. It should be a real pussy cat in the air and I'll have more to say about that down the road. Meanwhile, if you're looking for a fairly quick building fun machine that will be reasonably easy to fly, try the Graupner Chinook. It looks like a real Sunday flier's airplane. Having seen and flown in the full-scale version, I'm really looking forward to flying the quarter-scale one.

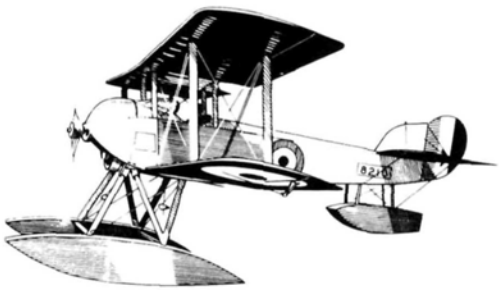
Dick Phillips, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

U.S. Quadra, 1032 E. Manitowac, Oakcreek, WI 53154.

Hobby Lobby Intl., 5614 Franklin Pike Circle, Brentwood, TN 37027.

Scale Model Research, 418 E. Oceanfront, Newport Beach, CA 92661. ■



WATTS UP?

(Continued from page 59)

fee is $5 and pre-registration is requested. For more information, contact Bernart Cawley* (CD).

The 1986 AMA Nats, this year at Lake Charles, Louisiana, will see offered E-power events sponsored by the EAA. These events will be 7-cell Sailplane, Unlimited Sailplane, and Battery Allotment Old Timer. The events will be held on Saturday, August 2, at the Sailplane site. I'll be the CD. Fees are $5 for the first event, and $3 for each additional event. The trophies to third place in each event will be official Nats trophies. Write to me c/o *Model Airplane News* for a flier on rules and details.

A bid has been placed with the AMA to host for the F3-E finals, to select the team to travel to Europe this summer. Mike Charles has just turned in the bid, and it requires selection through vote of the prospective contestants. It's not really settled, but if Mike's bid becomes the accepted one, the finals will be held in Southern California at the Harbor Soaring Society Field in Costa Mesa, California. Details should be available from AMA Headquarters.

Until next time, fly silently.

Bob Sliff, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies and people mentioned in this article:*

Midway Model Company, P.O. Box 9, Midway City, CA 92683.

Windsor Propeller Company, 384 Tesconi Ct., Santa Rosa, CA 95401.

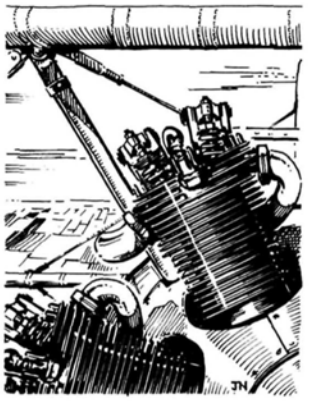
Robbe Model Sport, Suite 345/355, The Office Center, Plainsboro, NJ 08538.

Wilshire Hobby Center, 2836 Santa Monica Blvd., Santa Monica, CA 90404.

Ampere Flyer Products, P.O. Box 23, B-6200, Gosselies, Belgium.

K&W Enterprises, 7824 Lexington Ave., Philadelphia, PA 19152.

Bernart Cawley, Boeing Hawks, 210-37th S.E., #43, Auburn, WA 98002. ■



Four-Cycle Forum

by ELOY MAREZ

THE LASER ENGINE, which is produced in England, has been mentioned in this column before. Through the courtesy of Neil Tidey of A.G.C. Sales, Ltd.*, the manufacturer of the Laser, I have learned a bit more about this interesting powerplant. His letter tells us all about how the Laser came into being, but since it also includes a lot of interesting facts about four-cycle engine design and operation in general, I would like to share it with you:

"I've just received a copy of the January *M.A.N.* and read your 'Four-Cycle Forum' in which you mentioned the Laser engine.

"Perhaps I could give you some more information. The Laser project was started about 3½ years ago. A number of my local club members were running four-strokes and the interest and potential were obvious. I met Reg Gross, who lives in the same village and owns A.G.C. Engineering, a small company producing components for high-speed air-driven drills and other very high-precision contract work. Reg was interested in engines and we decided to see if we could manufacture a four-stroke engine.

"I checked out as many of the existing model engines that I could get my hands on and decided that this was not the way to go. The four-stroke engine was invented over 100 years ago and there was a wealth of information available. After much research we decided to make a cylinder head with a wedge-shaped combustion chamber.This shape is used on the Rolls-Royce car engine and certain American V-eights. It allowed the use of large 'squish' areas and good breathing due to the inclined valves. Anti-detonation qualities are excellent. A prototype head fitted to an existing engine proved the theory. The engine ran very well and idle was much improved. The engine ran on straight (FAI) fuel with a standard cheap two-stroke plug.

The Laser from A.G.C. Sales Ltd. is a beautiful example of what can be accomplished with some bar stock and a whole lot of savvy about four-stroke engines.

"Much encouraged, I set out to design the rest of the engine. The twin cam pushrod layout with valve gear at the rear gave many advantages. With the inclined valves the height of the engine is reduced and the highest point is well back, making it easier to fit into a cowl. Twin camshafts at the rear do increase component count but are unlikely to be damaged in a crash and help development as they are easily changed.

"Cam design is an art in its own right. I devised a computer program to develop a constant acceleration cam. The idea is to open and close the valves as quickly as possible but with minimum stress on the valve gear. The lift is quite conservative at 25% valve diameter. The further the valve is lifted, the quicker it will wear the valve guides, cams, etc.

"The new Japanese engines are now around 33%, which is the lift found on most racing engines. We also followed 'full-size' practice by using separate valve guides and seats rather than the combined guide and seat found on model engines. This increases the length of the bearing considerably and so reduces wear.

"The carburetor is fitted high on the cylinder head, which again is full-size high-performance practice. Gas flow is straight into the head for efficiency. As the cams are at the rear, the crankshaft is kept simple and the front end is very strong.

"The prototype engine first ran in April 1983. It was flown at a number of shows during the season and some fine work was done on the cams. The reaction to the engine was very encouraging. It

was flown in two models: first a ¼-scale Aeronca Champion weighing about 13 pounds (108-inch span) and a 64-inch low-wing aerobatic model weighing about 7½ pounds. Development work on the cams and head produced a really reliable and powerful engine with no detonation problems. We produced 17 development engines during the summer of '83 and our prototype notched up over 70 hours flying.

"The 120 V twin was the first, this ran in February 1984 followed by the 75. Development is a long and costly business. We got the 75 into limited production in May 1984 and displayed it at Sandown, one of our big trade shows. We joined forces with Chris Foss who manufactures a kit called the Wot-4. He is a superb flier and the 61 in the Wot-4 surprised a lot of people. It showed that not only could a four-stroke engine pull a model vertically, but it was reliable and the instant throttle control enabled the model to be flown in a very spectacular manner.

"Dr. Jeremy Shaw is well-known for his flying boats. His Saunders Roe Cutty Sark was re-engined with a pair of Lasers and he had a great deal of competition success. The model has about a 9-foot span and weighs over 20 pounds. Quite a few modelers were changing to Lasers!

"The prototype 90 was completed in August 1984. This was designed to pull large propellers at low speed and is a long stroke engine. The V was run throughout the season. New production techniques were being developed and the business was taking shape. This meant that delivery was about 8 weeks for the 61 and 75; we ran a very small number of the 120 Vs but delivery was longer than we would have liked.

"Our fortunes continued in 1985. The first production 90 came out in May and we exhibited at Sandown again and Chris Foss and his new Acro Wot with a Laser-75 stopped the show.

"Peter McDermott re-engined his Sop-with Snipe with a Laser-90 and Brian Taylor had a 75 in his Spitfire. They took top places in most of the scale events, and Brian won the British Nationals. They will be representing Britain in the World Championships in Oslo. Chris Foss is the third member but he qualified using a Japanese two-stroke and the SMAE (your AMA) will not allow him to change the engine to a Laser. The engines have become very popular in vintage models.

"Production capacity limited the 120 V but we have been testing a 150 version. Our prototype 45 ran in February 1985 and flew at many shows. This engine has created a great deal of interest.

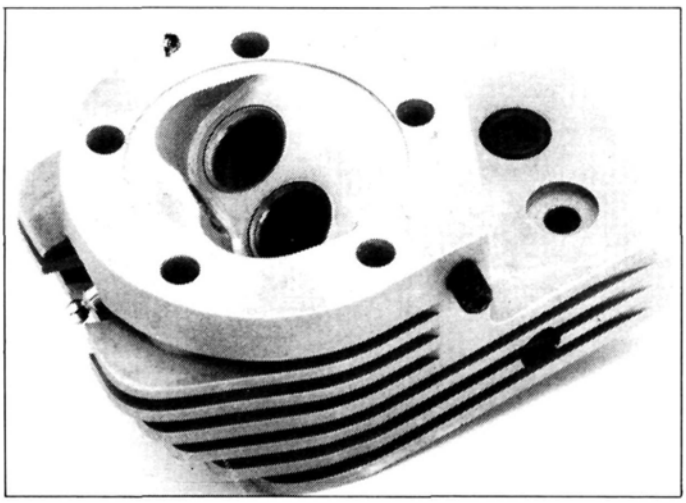
"We have produced our first 1,000 engines and they have reached 20 different countries. Production is increasing well and we are improving our stock of components. Delivery is now 4 weeks ex. factory for the 61, 75, and 90. Delivery for the 120 and 150 V is about 8 weeks and we expect the 45 to be available in May. Due to dollar-pound fluctuations, payment must be made by banker's draft or IMO in pounds sterling. The price is as the U.K. price shown, which includes airmail post and insurance but not any duty that could be imposed in the U.S.

"As you know, manufacturing engines from bar stock is very expensive so to be competitive we can only sell direct. This does mean that we have personal contact with our customers (we even stamp our customers' initials on the engine) and can sort out any problems easily. The engine is very tough and we have never charged more than £25 for any repair. No one has broken a front housing or crankcase but we have had a couple of bent crankshafts. Making the engines from bar stock creates a more rigid engine, capable of withstanding the stresses encountered in a four-stroke engine.

"It is our aim to produce the highest quality engines available. Reliability, long life, and engines that are a delight to use are qualities as important as pure performance. Developments at present include a petrol version of the 90 with a separate lubrication system for a Ministry of Defense contract and you may see a supercharger.

"By the way, we recommend only straight castor-based fuel. We think that nitromethane is a major cause of corrosion in four-strokes. I believe that it produces nitric acid when burnt. Castor oil may also be superior to synthetics. We have never had to replace a bearing through corrosion.

"At present we are trying to get Super-Tigre to make our carburetor without a throttle stop. I believe it is essential to be able to close the throttle to stop the engine so most people set the trim on the radio to cut the engine when pulled back. There is also a danger that the throttle servo could be stalled and drain the battery if the stop is used. I know that Clarence Lee is a firm advocate of the throttle stop, but would be interested in your views and those of your readers. Your article on running-in is really excellent, keep up the good work."



Unique head design of the Laser shows a number of special features. See text.

If you are interested in obtaining a Laser, the first step would be to call your bank to obtain that day's dollar to British pound exchange rate—they vary daily. As of this writing, to be used as a guide only, the exchange rate is $1.44. The U.S. dollar hasn't been doing too well in the world market lately. Neil's reference to banker's draft refers to a cashier's check, and an IMO is an International Money Order, which is obtainable at post offices. Your local American Express office is also a good source of information about currency exchanges.

My experience has been that ordering merchandise from foreign countries is extremely easy once payment has been arranged for. I've received parcels from

(Continued on page 120)

Pattern Matters

by MIKE LEE

ONE OF THE MORE interesting letters I've received lately was from Clair Sieverling of Phoenix, Arizona. Clair is a good friend and flight-line buddy, and we've had some pretty good talks about the pattern wars. His letter discussed problems he experienced with performing knife-edge flight, such as point rolls and slow rolls.

The gist of the problem seems to be that Clair's ship was deviating from a straight line, either toward the canopy side or toward the belly side while in knife-edge flight.

While I know that flying on the non-lifting side of the ship isn't exactly easy for the plane to do, most pilots would appreciate having an easier time doing it, so let's talk about some remedies for this problem.

To be competitive in any pattern activity your model must be warp-free and properly aligned. Prettner's TOC-winning Dalotel could be considered the ultimate in proper airframe setup.

Imagine doing a four-point roll to the right. On entering the roll, the ship comes to its first point at a right-side knife-edge, and begins to pitch toward the canopy. In order to diagnose the whole problem, the ship must continue through to the third point, so that it is in the left-side knife-edge. Again, the ship heads toward the canopy. These are the symptoms, so let's examine probable causes.

One of the first causes is excessive dihedral in the wing. Too much dihedral in the wing causes the ship to create an abnormal amount of lift to the bottom side of the wing, causing the pitch to the canopy. A second cause, and a much more common one, is an incorrect wing incidence in relation to the stab and centerline of the ship. Too much positive incidence in the wing means that the elevator is probably showing a slight amount of down-trim while in level flight, making the ship go toward the belly in knife-edge flight. If the wing doesn't have enough positive incidence, then the elevator shows up-trim in level flight, and causes the pitch to the canopy in knife-edge.

Wait, there's more. If the ailerons aren't in proper alignment with the wing trailing edge, this can cause a mild flap/spoiler effect. The ailerons can add or detract lift from the wing while in level flight, yet in knife-edge flight, they become long rudders. Think about it a minute and you'll see.

How about the engine alignment? If the engine displays excessive up or down thrust, it can cause havoc in the knife-edge. Of course, the engine will also play havoc everywhere else at the same time, but it's worth checking out.

The last possible problem is what Clair brings up; tail-surface alignment. According to Clair, it's quite easy to get unwanted pitching from a vertical stab that is not exactly perpendicular to the wing.

Imagine viewing the ship from behind and looking at the tailfeathers. By looking at the ship sideways, simulating knife-edge attitude, imagine the vertical stab with the tip slightly lower than the root. This particular position of the vertical stab will cause the airflow to deflect slightly off to the side, rather than straight up, which results in the tail being pushed slightly sideways in the opposite direction. If the airflow was straight up, the movement of the tail would be straight down. But you're looking at a slightly bent tail, so the movement goes slightly sideways while moving downward. There you have an undesired pitching movement.

The remedy isn't as easy as taking aspirin, but you might want to keep them handy just in case.

The first problem was improper wing dihedral. You can either cut the wing in half and reset the dihedral to the correct setting, or you can add wing gates to the tips. In the first case, you must decide whether you have too much dihedral or not enough. If the pitch is positive, toward the canopy, it's too much. If the pitch is to the belly, then there's not enough.

The second remedy is easier but not as pretty. This involves placing small fences or gates on the wing tips of the ship, on either the top or bottom of the wing. The gates are usually about two-thirds to three-quarters the width of the wing tip and the depth of each varies with the amount of desired effect. In each case,

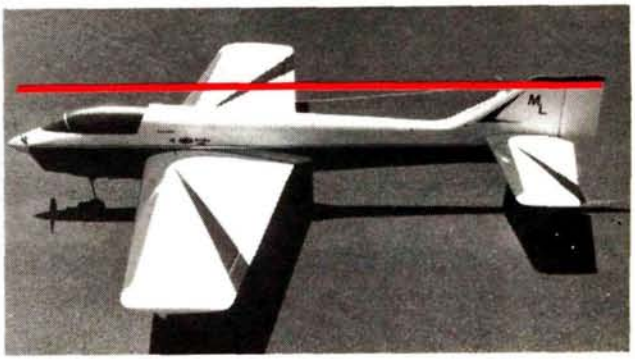
the gate is placed on the bottom of the wing if the ship deviates to the belly, and vice-versa if it deviates to the canopy.

The theory behind this is that the gates prevent airflow from escaping over the tips of the wings, known as tip vortex. Normally, tip vortex works from the bottom of the wing and comes over the top of the tip. A gate on the bottom stops the flow from advancing, creating more lift to that side of the wing. When the gate is placed on the top, it prevents the airflow from engaging with the upper wing airflow. This decreases drag in the wing, while enhancing the lift from the upper surface of the wing. The overall effect causes a decreased tendency to deviate. Whew!

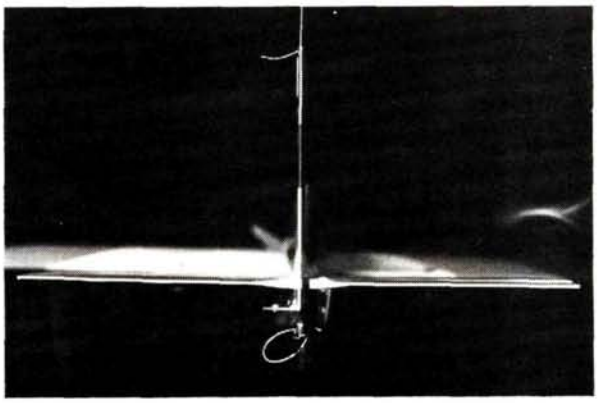
Now the incidence problem. This can be easily overcome in the construction phase of the project. Build it right in the first place, but, if it's too late for this, then you can start shimming the wing. This involves placing shims of almost any material under the wing at the leading or trailing edge, between the wing and fuselage. Basically, if the ship drives to the belly, shim the trailing edge. If the opposite is true, shim the leading edge. Do this in small, but measured and consistent increments. If done right, the plane should fly nicely in any flight attitude.

Let's tackle the ailerons in one quick step. Use an incidence meter if you have to, but get them set up straight. For you guys who utilize flaperons, may the trim gods have mercy on you when it comes time to point roll. For insurance, you should have the flaperons control set so that it's easy to find the neutral position for the ailerons not engaged in flap action.

Well, engine alignment problems will rear their ugly heads in almost every phase of flight. If you have more than a couple of degrees any which way, it's probably too much. At best, right-thrust shouldn't exceed 2° and down-thrust about 1°. Bring out that incidence meter and find out.



Incidence alignment is also an important consideration. See text.



An example of improper alignment can be seen in the photo at left.

The case of the bent tail is the last problem. What can I say except that you've got to build them straight. If the construction is of balsa, you can attempt to straighten out the tail by steaming the balsa wood and gently twisting in the opposite direction. Now don't blame me when the paint cracks or the tail comes whistling off in a crack of thunder and balsa, just be careful and take your time. A lazy way to do this is to pour water into the tail, then quickly drain it out. Now that the wood is wet, let the airplane come to rest on the horizontal stab. This is too far down and the weight of the plane will twist the tail for you overnight. Again, don't blame me for blistered paint and shaggy wood.

A fiberglass ship is easier to remedy but a bit warmer in the process. Using a hair dryer, gently heat up the fiberglass fuselage and twist the tail in the desired direction. Again, if you're careful and gentle, the right results will quickly occur. I can see it now; letters of horror giving blow-by-blow accounts of how someone's plane melted into oblivion before their very eyes. Like I said, you should have done it right in the building stage.

Mike Lee, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

BALSA USA CITABRIA

(Continued from page 32)

gentle flying machine that my nerves were at rest.

I must admit to being fooled by the first landing. I cut the power too soon and made one of those undesirable three-point landings—the type where you go from wing tip to prop to wing tip. The only damage was to the prop and to my pride. At least it showed the structural integrity of the design, as everything remained very solid.

By keeping a little rpm on my side until just before touchdown, further landings salvaged my ego. With struts and tail braces, the Citabria represents a relatively high-drag airframe.

There was much satisfaction garnered from this project. In this era of ARFs, it's very rewarding to complete an airplane that you actually build from pieces. Sure, it takes longer than a pre-fabricated kit, but I feel that the satisfaction is proportional to the time invested.

The Citabria Aerobatic Pro, as well as any of Balsa USA's kits, gives the modeler a quality kit at a very reasonable price. Pick the Citabria or any of the others and you'll enjoy the experience.

**The following are the addresses of the companies mentioned in this article:*

Balsa USA, P.O. Box 164, Marinette, WI 54143.

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008.

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.

Futaba Corporation of America, 555 West Victoria St., Compton, CA 90220.

K&B Mfg., 12152 Woodruff Ave., Downey, CA 90241.

Great Planes Model Dist., P.O. Box 4021, Champaign, IL 61820. ■

NEW WAVE

(Continued from page 23)

Before sheeting the wings, you have to decide if you're going to use one servo or two. If you're going to use one for the ailerons, the pushrod passes through W1 and into the fuselage. A very simple way to allow for a hookup to the servo is to reverse one bellcrank, so a pull results in down aileron on one wing and up on the other. This way, the hookup is on opposite sides of the servo and eliminates any complicated linkages. I placed the servo for the flaps and ailerons on a separate tray below the fuselage servos, in a stacked setup, with the output arms as close to the bottom of the fuselage as possible. This makes it very simple to hook up and disconnect. To accomplish this, keep the pushrods as close to the bottom wing sheeting as possible.

If you use two servos, you must make a hatch between W1 and W2. This allows a simple hookup via Y-connector without the use of extension cords.

Sheet the wings and add the tip blocks and cap strips. Build the aileron and, if you wish, cut in the flaps. The flaps aren't mandatory, but I like them, as they do improve on the landing speed and distance.

Drill F1 for the throttle cable fuel lines and radial mount. You can also install the tank now. I've found the 12-ounce tank to be plenty. Place and glue the tubing as required for the throttle cable.

The top decks can be built in the fuselage or on the bench separately. The top decks build up very easily and are straightforward so I won't waste much time with detail. Once the main structure is complete, sheet the top decks. To prevent splitting or cracking, moisten the sheeting on the outside only, using water or household ammonia. Be sure to glue in the 1/8-inch ply cowl support plates. Note: The cowl can be moved forward or rearward to allow for different types of radial mounts that might be used.

To fit the cowl, some sanding might be required. On my airplane very little was needed. The best way to fit the canopy to the fuselage is to mark around the outline and sand the top decks to the thickness of the fiberglass. Glue the canopy in place and sand to a flush fit. For ease of finishing, paint the canopy before the iron-on covering is applied.

Now build the stabilizer. The stab and fin are very simple and take little time. Block up the leading edge and the hinge spar so they are parallel. Glue the ribs in place and sheet as required. Don't forget the 1/8-inch ply horn mounts.

To build the detachable stab section, glue the partial 1/8-inch fuselage sides to the 1/16-inch ply floor. Glue in pre-drilled hardwood that is tapped for 1/4x20. Bolt to the fuselage. Glue F10 in place, complete with 3/16-inch dowels. Slide the rear dowel support in place, push in the dowel, and glue in place.

Now glue the stab to the cradle. Make sure the stab has 0° incidence and is aligned accurately to the wing. The hingeline should be 90° to the centerline of the fuselage. Now glue the fin in place perpendicular to the stab. Using soft light balsa, fill between F10 and fin and stab with soft sheet or scrap.

The tailwheel is connected to the rudder with a 90° bellcrank glued to the bottom of the rudder and a short pushrod to a brass horn soldered to the tailwheel wire. This allows the stab to be removed while allowing the tailwheel to remain attached to the main structural part of the fuselage.

There are two methods for retaining the wing in place. You can use a 1/4x20 bolt in-line with the chord line passing through the fuselage side and tapped into W1 or use J-hooks and rubber bands as used in gliders. Because there is no stress outwardly on the wings, excessive tension isn't required. Use two rubber bands if you use this method, because if one should break, the second will stop the wing from departing from the fuselage.

For best performance I recommend iron-on plastic films. Using this method, you probably won't exceed a flying weight of 9½ pounds without fuel.

For initial flights, control throws should be set as follows: elevator, ½ inch up, 5/8 inch down; aileron, 5/8 inch up, ½ inch down; and rudder, 1¾ inches left, 1¾ inches right.

One important thing to remember is that this airplane is not intended as a trainer. In the hands of a competent sport flier, it's lots of fun and looks great in the air. I've flown the complete Turnaround pattern many times and my airplane has nearly 250 flights on it, with no problem so far. A click of throttle during flare makes the landings greasy and scale-like.

You can still substitute dural gear for the wire gear if you want. A balsa fairing on the wire gear really improved the appearance.

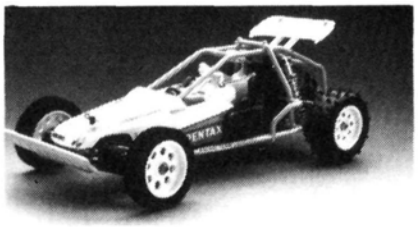
The 6061 T6 aluminum tubing can be purchased at most aircraft supply or ultra-light supply stores. If you don't like carving, I can supply the fiberglass parts and the aircraft tubing. The canopy and

(Continued on page 98)

Product News

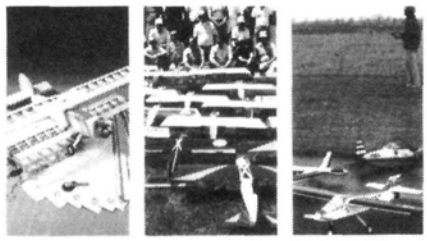
BOOKS FOR BUFFS

The Spring 1986 catalog is now available from Historic Aviation (3850M Coronation Rd., Eagan, MN 55122). The catalog includes thousands of books covering all aspects of aviation, such as antiques, foreign aircraft, warplanes, aerobatics, pilots, model aircraft, calendars, and much more. For your free catalog, write to Historic Aviation or call 1-612-454-2493.



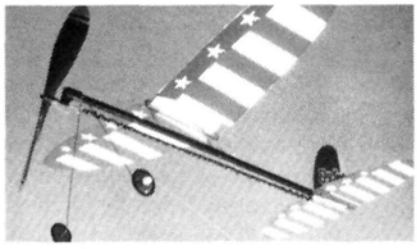
CIRCUS TOMCAT

Circus Hobbies (3132 S. Highland Dr., Las Vegas, NV 89109; 800-782-0022) announces the addition of the Tomcat to its growing R/C car line. The Tomcat can be favorably compared to other popular cars in terms of strength, speed, and agility. Pre-assembled, with ball bearings included as standard equipment, the Tomcat requires only radio component and battery installation to be track ready. With a powerful RS 540 motor, this two-wheel drive aggressor features a super-quiet notched belt drive system that is adjustable from 7.3:1 to 9.9:1. Heavy-duty, rear differential gears are standard.



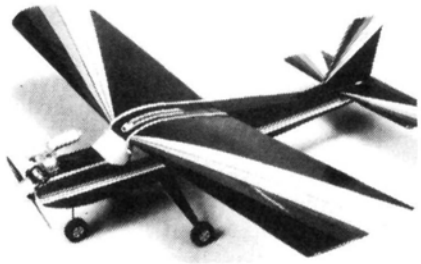
MIDWEST BROCHURE

Midwest Products Company (400 S. Indiana St., P.O. Box 564, Hobart, IN 46342) has a new R/C Model Airplane Kits Brochure featuring their R/C model airplanes and accessories in full-color. Whether it's a competitive wooden sport flyer or an aerobatic ARF kit, Midwest has the model that's right for you. The brochure is available for $1.



MRC SKYLARK

Stick-style, rubber-powered airplanes are almost as old as the first man-carrying airplane; however, there have been thousands of improvements in full-size airplanes and none in free-flight stick planes until now. Model Rectifier Corporation (2500 Woodbridge Ave., P.O. Box 267, Edison, NJ 08817) has brought out the Skylark rubber-powered stick airplane, featuring styrofoam wings and tail surfaces for longer lasting, farther reaching flights. The kit comes with brightly pre-painted wing surfaces for more attractive looks than those possible with balsa sheet wings. Parts snap together and adhesive tape is included to fasten the airfoils to the plastic mounts. The proof of the pudding is in how the Skylark flies. It can be adjusted for height, duration, and flight pattern by moving the wing and the tail controls before launch. Both adults and children will get a charge out of the lazy circles and crazy climbs this stick plane can achieve.



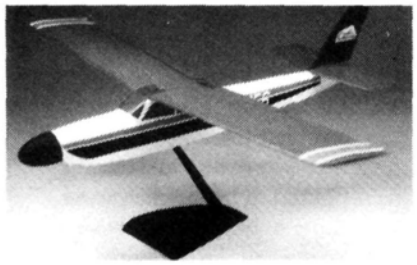
MODELTECH TRAINER 40H

World Engines introduces the Modeltech Trainer 40H. This relatively large, low wing loading, easy-to-fly model has quite a bit of dihedral and a flat-bottom wing. It has tricycle gear for easy ground handling. The model is 95% pre-built (the wing must be joined, and the control surfaces, rudder, and elevator assemblies must be glued on the fuselage). It has a 58⅞-inch wingspan and requires a 3-channel radio and a .25 to .40 two-stroke or a .40 to .61 four-stroke to fly. The Trainer 40H is capable of all kinds of maneuvers but it is also very stable for beginners in R/C. The Trainer 40H is available only from World Engines (8960 Rossash Ave., Cincinnati, OH 45236).

PACTRA ACRYLIC PAINTS

Pactra's (Pactra Industries, 16946 Sherman Way, Van Nuys, CA 91406) new water-based acrylic paints are easy to use and a breeze to clean up. From Lemon Yellow to Olive Drab, Pactra's acrylics span the spectrum to give you 48 gloss and flat colors—including some flats that match popular Federal Standards. Pactra's acrylics can also be used with airbrushes—use them as they are or thin them with a few drops of water.

Descriptions of new products appearing in these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee of performance or safety by M.A.N. When writing to the manufacturer about any product described here, be sure to mention you read about it in **Model Airplane News**.



MRC EASY LAUNCH GLIDERS

Kids and gliders are a great combination. Model Rectifier Corporation (2500 Woodbridge Ave., P.O. Box 267, Edison, NJ 08817) has brought back that fun in a new form with its Easy Launch series of styrofoam gliders. Each kit comes with pre-painted wings and bright adhesive decals. No glue is needed since all parts go together with special double-faced adhesive tape. Parents will appreciate the safe rubber nosecap that also provides a good balance to the airplane. New pilots will like the flying instructions included with each kit for longer flights and more impressive stunts. Choose from the Centurion, the Aeronca, or the Yellow Cub kits, or buy them all for a fabulous airfleet at low cost.

ROUSH TAYLORCRAFT

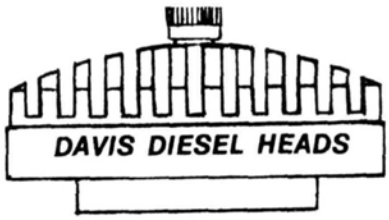
The Taylorcraft was introduced in 1936; the 1946 version is probably the most popular and is still in production after 50 years. Roush Manufacturing (1728 Bywood St. S.E., Canton, OH 44707) is introducing a ¼-scale 1946 Taylorcraft. It can be built either full-span at 9 feet or clipped wing at 7 feet from the same kit. Construction is balsa and ply with a large number of cleanly cut die-cut parts. The kit has been simplified for the modeler who wants a scale looking airplane without all the scale hassels. Flying weight is 10½ to 11½ pounds and is ideal for .75 to 1.2 engines.

ROYAL TELSTAR

The Telstar from Royal Products (790 W. Tennessee Ave., Denver, CO 80223) features "buy today, fly tomorrow" assembly. With a wingspan of 50 inches, a wing area of 443.5 square inches, and a fuselage length of 43 inches, the Telstar requires a .25 to .40 two-cycle or a .40 four-cycle engine and a 4- to 5-channel radio. The kit includes all necessary hardware and has lightweight foam/plywood construction. An illustrated step-by-step construction manual is included.

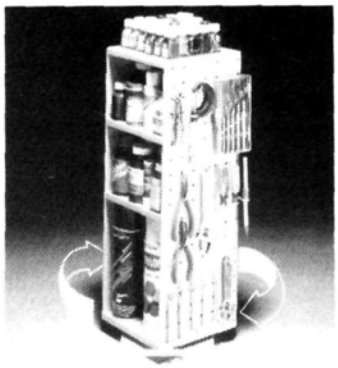
DAVEY SYSTEMS ARIEL

A new hand-launch sailplane kit is available from Davey Systems Corp. (1 Wood Ln., Malvern, PA 19355). The 1½ meter Ariel is a two-channel, 58-inch span sailplane designed for hand, grenade, slope, hi-start, or winch launches. Flying weight is 15 ounces with a 370-square-inch area for a 5.5-ounce-per-square-foot wing loading. The kit features step-by-step instructions, complete rolled plans, and accurate machine- and die-cut selected balsa, spruce, and plywood. The Ariel incorporates the popular Prophet series modified E-193 airfoil for the wide speed ranges a small sailplane should have. Strength to withstand launching on any winch is provided by ⅛x¼-inch spruce spars.



DAVIS DIESEL INFO

If you've been reading about diesels or dieselized model engines but don't understand them, if you have an old or new foreign or old domestic diesel, but don't know how to run it, if you have not been able to get the performance you want out of your diesel or dieselized engine, or if you're just plain curious about the darn things, Bob Davis of Davis Diesel has just released a new instruction book on his product, only it's more than just your typical four pages of instructions. This book is a wealth of knowledge from the basics of combustion and temperature balance to engine adjustments for boat, plane, car, or chopper applications. If you want one, send $1 and a stamped self-addressed envelope to Davis Diesel (P.O. Box 141, Milford, CT 06460).



TURN A TOOL

The Turn A Tool pegboard organizer is a unique rotating table-top storage unit for hobbyists, crafters, artists, architects, draftsmen, seamstresses, etc. Ideal for home, workshop, or office, Turn A Tool keeps tools and supplies at your fingertips. It provides valuable extra storage space and ends work area mess and clutter. The price is $19.95 plus $3 for shipping and handling, and 12 pegboard hooks are included. Write to Visual Enterprises (P.O. Box 39372, Phoenix, AZ 85069) to order yours.

NEW WAVE

(Continued from page 95)

2-piece cowl are $38.00 Cdn., the all aluminum tubing is $12.00 Cdn., the wheelpants (untaped) are $12.00 Cdn., and wheelpants (taped) are $20.00 Cdn. Send check or money order to Gordon Jack, #12-7170 Hart Highway, Prince George, B.C., V2K-3A8, Canada; (604) 962-8360.

If you decide to build the New Wave, I think you'll really enjoy it. ■

CONTROL TOWER

(Continued from page 28)

mitter first, get a red indication, then the receiver battery and the LED will turn green. After a couple of tries, it's easy. Charging time is nominally 15 hours.

Next is a color-coded frequency flag and antenna mounting holder. A transmitter neck strap is also provided, as are two servo trays, one for three servos plus an On/Off switch and the other for the aileron servo. Lastly, there are a total of four splined horns, two with arms (4 and 6) and two wheels (1⅜-inch diameter, no holes, and 27/32-inch diameter, with holes) and finally a switch-mounting plate.

I think Futaba has another winner with the Conquest 4. It's well made and packaged, and has many features found in considerably higher priced sets, yet lists for about $210 and can be bought for as little as $103. In particular, the gimballed sticks with electronic trim and adjustable feel are not normally available in sets sold at these prices. I enjoyed this review and look forward to bringing you new Futaba radios in the future. Should you contact Futaba for more information, please tell them you read about the Conquest 4 in *M.A.N.*

Charlie Kenney, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220. ■

GATOR BAIT

(Continued from page 36)

Add the legs with epoxy and check that they are all properly aligned and positioned with a 90° square.

Position the pod assembly flush with the back edge of the craft on the centerline. Epoxy the legs to the deck, install the plywood insert between the legs on each side, and add strips of quarter-round to each side of each set of legs for a nice rounded effect and more glued surface strength. Finally, center the rudder support arm on top of the pod, flush with the back, and epoxy in place.

Assemble the rudders by gluing the doublers on the inboard sides flush with the bottoms. Mount a hinge strap on the bottom of each rudder as shown above. Mount the other hinge strap on the top deck in line with the rudder support arm and with the extreme end of the hinge flush with the back of the deck.

With the rudder hinge assembled, carefully mark the location of the top hinge strap and drill holes to make an oblong opening in the rudder for the strap end. Cut a vertical slot halfway through the rudder for the hinge pin and secure it with the straps and screws.

Place the rudder in position. Be sure the alignment is proper for smooth movement and drill holes in the rudder support arm to secure the upper hinge strap with sheet metal screws.

The remaining pieces can be assembled as shown below with Pacer's* Zap-A-Gap or similar adhesive. The slot between the dashboard and cockpit front is for a Plexiglas windshield (optional).

At this point your craft should look like the one in the photos. Again it's decision time. We elected to paint first and used a single coat of K&B* Super Poxy Clear to seal the entire surface. That was followed by a single coat of Insignia Blue. Finally we added Top Flite's* MonoKote Trim insignia and flags. The prototype, which is yellow in the lead photo, was painted with polyurethane and the alligators were hand-painted by Linda Cooley (Bud's wife). The "Gator Bait" names are vinyl stick-on letters from the hardware store.

Mount the engine on the front of the pod with machine bolts, nuts, and lockwashers. Install the tank after drilling two holes for fuel tubing which is connected to the engine and left to vent respectively. Route the throttle cable down the left front pod leg, through the top deck, and forward to the servos, which are to be located just inside the

hatch. Use flexible cable and pushrods for engine and rudder controls.

Remember that each end of the outer pushrod housing must be firmly anchored. The rudder horns are mounted inboard on the rudders at an angle to match the pushrods and with pivot holes in line with the centerline of the hinge pins. This makes for aerodynamically balanced rudders.

Since we occasionally attempt to "bump" our Gator Baits, a little planning would yield a foam core hull. It's also possible to use Sig* Foam (two-part mix) to fill the interior with foam but if you do this, don't try to fill it all at once. If your group builds a fleet of them, mount rubber bumpers at bow height.

Connect the servos, mount the radio, and let's go! Left is left, forward is fast. Fuel it up, start the engine, and jump back, folks, jump back!

**The following are the addresses of the companies mentioned in this article:*

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008.

K&B Mfg., 12152 Woodruff Ave., Downey, CA 90241.

Top Flite Models, Inc., 2635 S. Wabash Ave., Chicago, IL 60616.

Sig Mfg. Co., Montezuma, IA 50171. ■

GOLDEN AGE OF R/C

(Continued from page 46)

Remember that the aerodynamic setup used with real early birds might not adapt to overpowering, especially the rudder-only aerobatic designs which were adjusted to a particular flight speed. Slightly later designs accepted more power with little trouble, so evaluate before proceeding. For example, the Live Wire design would handle a wide power range quite easily, while the hot contest designs would not.

Your initial response to this column is encouraging and most helpful. Apparently a majority of you have considerable interest in the history and happenings of those times so I'll continue to thread my way through it all as it happened.

If you weren't part of the initial response, why don't you join us? Good black and photos are always of interest.

Hal "Pappy" deBolt, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

OFFSHORE

(Continued from page 77)

where the extra material is by feeling the thickness of the blade between your fingers and then comparing it to the same area on the opposing blade. You'll be surprised how accurate your fingers can be.

You might find that it's not a blade that hangs down, but the side of the hub between the blades. If this is the case, check the thickness of the blade by the procedure mentioned above to make sure you don't have a heavy tip on one blade and a heavy center on the other. With this possibility eliminated, you've probably got an out-of-balance hub, in which case you can either remove weight by drilling shallow holes on the heavy side (not all the way through to the center hole), or, as I prefer, by thinning the offending hub side.

From here on in simply refine what you've done by going to progressively finer grits on the sanding disc and constantly checking the balance as you go. At this point you can also polish the rest of the blade, being very careful not to round any corners, or add any roundness or curvature on the back side of the leading edge. This is very important. Any rounding in this area will lead to drastically reduced performance.

Sometimes when finishing a prop you'll find small voids in the casting. I've been told that in some cases these can be filled by the judicious use of Sta Brite Silver Solder. Don't try this with large holes or anything structural, or you may be dodging flying solder.

As far as other modifications to propellers, there are some that can be quite useful and others whose value may be dubious at best. The only change that I make on a prop is to reduce the blade area when necessary. I needed a straight-away prop for my outboard outrigger (Phoenix) but I couldn't find one with the required pitch (4 inches plus) and a small enough diameter (1½ inches) so I proceeded to cut down an Octura 2.2 prop to 1½ inches. The boat ran 63-plus miles per hour and set a couple of records.

Please note, however, that the basic blade shape has not been changed from the full-size 2.2. If you wish to remove blade area from an existing prop, remove it from the leading edge proportionately so the prop you are left with will look like a smaller version of what you started with.

OFFSHORE

(Continued from page 77)

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If you want to experiment with different blade shapes, first check out the available commercial props; anything that will work is probably already available and any shapes that are not available are probably a little far out and might not work too well. If you want to get into this area, you're on your own.

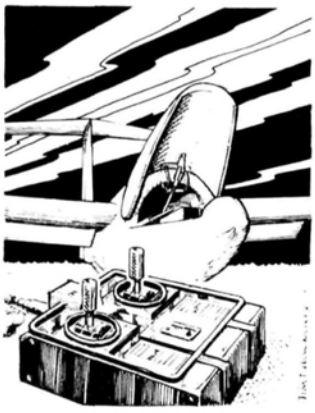
A good option for those who wish to tinker is the Hughey "Dial-A-Prop." This is a prop-making system from Dee Hughey which allows you to make any type of prop desired using stainless-steel blades silver soldered to a brass or stainless-steel hub. This system is a real boon to tinkerers.

What happens when your prop comes back to the beach after trying to saw a log in half? Well, the options will depend on the amount and type of damage. The most common damage is a rolled or bent tip or leading edge. If the bend is not too severe, you may be able to bend it back in place by hammering it lightly with a smooth hammer over a smooth piece of metal. Keep in mind that the alloy props are made from isn't the most ductile metal known. In other words, if you bend it too many times (about three times) it will fatigue and probably break, either right when you're bending it or when the boat is running, thus tearing out the strut.

Sometimes a blow to the prop will change the pitch of the whole blade. These can sometimes be carefully repitched, again with a hammer. A pitch gauge like one from Steve Muck R/C Boats is invaluable in determining pitch differences between blades or, for that matter, determining the actual pitch of a prop. (They aren't always what they're marked.) A prop with severe edge damage can sometimes be saved by removing the damaged area and making it into a smaller diameter prop, which might be just the thing for your smaller boat.

I don't really know that an immaculate shine will really improve performance of a prop that much. Smoothness is probably more important than shine, but if shine is your thing, just be careful that you don't round off any of those carefully prepared sharp edges, or your shiny prop may turn out to be a real turkey.

John Oian, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■



Soaring News

by JIM GRAY

I'VE COVERED one-design sailplanes in this column before, but a brief summary is in order. Basically, you get a group of pilots together to fly the same rules with one sailplane type, such as a Goldberg Gentle Lady, an Airtronics OLY 650, or a Midway Model Company Gnome. The CD and his committee decide on exactly what variations or modifications, if any, will be allowed. The weight and wing loading can also be specified, although it isn't often necessary, because if you fly ballasted at the start, you have to continue each round the same way. What's the idea? Simple: it's a contest between *pilots,* not between *sailplanes.* Sure, the best pilots always seem to wind up in the top third anyway, but at least you know why they are there—sheer ability.

Anyway, I know there was a one-design contest in April sponsored by D.U.S.T. of Palmdale, California. The sailplane was to be the Gnome, designed by John Lupperger. It's a neat, inexpensive, and relatively-high-performance 2-meter bird. I'll let you know more when I hear the results.

The Carl Goldberg Memorial Contest

As you will recall, we asked for sponsors for the Carl Goldberg One-Design contest, and literally dozens of clubs around the U.S. responded by scheduling their contests last fall. Most of them used the Gentle Lady as their one-design machine, in Carl's honor. In particular, I received a contest report from the Clarence, New York, Sailplane Society whose contest was held last September 8. Although I don't usually feature contests because of their limited interest and strictly local flavor (not to mention the lack of timeliness caused by deadline requirements) I feel that this one is special, and that for Carl's sake you won't mind.

The Boy Scouts helped as beauty contest judges and winch drivers at the Carl Goldberg One-Design category at the Clarence, New York, Sailplane Society contest.

Instead of a separate contest, the CSS added a Gentle Lady category to the already-planned modified standard and open classes. The contest opened amidst a roaring and rampaging thunder/lightning/rain storm that threatened to blow everyone away. Nevertheless, Roman Paryz, who reported the affair to *M.A.N.* said that Carl must have been watching and smiled on the club because the skies cleared and the sun came out in time for the pilot's briefing.

Billie Kingsley, CD, called for three rounds of T4 cumulative duration as the Gentle Lady task. Thirteen contestants scratched and struggled in the meager lift for two rounds, but by the third round, lift was everywhere and several maxes occurred. The top four finishers were Josh Glaab, Niel Tinker, Mike Vitale, and Roman Paryz.

A beauty contest was held for Gentle Ladys (not ladies) and the Boy Scout winch drivers were judges. Lyn Perry's multi-colored (red, orange, yellow, green, blue, and white) Gentle Lady with Kermit the Frog as pilot easily captured top honors.

The day's events were rounded out by a Gentle Lady raffle (kit donated by Carl Goldberg Models) and a Futaba radio (donated by the manufacturer) both of which were won by Don Chudyk.

Final tally on proceeds was $300 after expenses, which was donated to medical research in Carl's name. Not bad for a day that started out with thunderstorms!

M.A.R.C.S. Symposium

If you haven't heard about the M.A.R.C.S. National Sailplane Symposium, then I guess I've been derelict in my duty. Each year, the Madison Area Radio Control Soaring group meets in Madison, Wisconsin, and hosts a two-day seminar on subjects of interest to sailplaners and soaring people. This

seminar usually takes place in November and each day is packed full of interesting speakers who give papers on every imaginable subject—American, Canadian, and British national contests; a one-design contest for the OLY 650; something called the Hundred-Minute Club; meteorology; stability factors, computers, and the modern (R/C) sailplane; hand-launched gliders; scale; foam core

Don Chudyk won the Gentle Lady raffle, which included a Futaba radio.

preparation and techniques; F3B panel discussions; new radio equipment and future trends; and much more.

Best of all, gang, in case you couldn't attend, the proceedings of the 1984 symposium are available in a beautiful soft-bound copy with over 150 pages! You can order this from the address given at the end of this column, and it costs only $8 postpaid (third class) or $9 for first-class mailing. The 1985 symposium will be available sometime in 1986, but I'll bet you won't be finished reading all the good info contained before the next one comes out.

A bevy of Gentle Ladys. Over $300 was donated to medical research in Carl Goldberg's name.

Scale Fever

I'd like to mention a really great source of scale information for those who like to build faithful scale replicas of their favorite sailplanes. Bob Banka bought Scale Model Research* a year or so ago, and has dozens of full-color photo packages for scale documentation. You may recall that a few issues ago I mentioned Bob's name but failed to give his address, so this time you'll find it at the end of this article. Please mention "Soaring News" and *M.A.N.* when you contact Bob for more info. You should also let him know what other sailplanes you'd like info on, in case he doesn't have the exact one you need.

For example, you can get info about 30 sailplanes and a dozen powered sailplanes. The information you get costs between $10 and $20, and includes anywhere from half a dozen to two dozen color photographs. A lot of cockpit detail is often given, as well as the usual markings, and general views. Both U.S. and foreign types are represented.

You can also get Koku-Fan drawings of powered aircraft, three-views, and of course the famous packages of color photographs, on types which range from the dawn of aircraft right down to the latest USAF and Soviet AF types. These might make excellent subjects for those scale jet slope soarers you've heard me talk about recently.

Send $2 to Bob Banka at Scale Model Research to get the catalog of available

Top finishers in the Gentle Lady category were Josh Glaab, Niel Tinker, Mike Vitale, and Roman Paryz.

scale aircraft information. It's a 22-page honey of a catalog that will have you drooling for days.

Slope Scale

Once again, for those who may have just tuned in to this issue, I'd like to mention that scale slope soaring is being done in an entirely new and different manner: scale models (un-powered) of *jet* aircraft are being built and flown on the slopes as soaring machines. Mock combat has been indulged in, as you might expect, and those who have seen MiG-15s and F-86 Sabers dog-fighting on the slopes say that the sight is outstanding. The interesting part is that most jets are well proportioned for sailplanes (bet you thought only the U-2 would be any good for this) to be used on the slopes. The ability to get nice camouflage and markings effects is ever present, plus the fact that the performance is right up there with other slopers.

In England, they are now using scale slopers of the Me-109 and Spitfire, plus dozens of other machines that seem to lend themselves to the idea. A Macchi MB-339 Italian Air Force trainer is popular and a particular favorite of mine is the Soviet LA-15, a contemporary of the MiG-17. It has ideal proportions, an

Lyn Perry's multi-colored bird easily won the Gentle Lady beauty contest.

absolutely fantastic glide, and real stability. It's an uncommon machine, and you may have to go to *Jane's All the World's Aircraft,* available through your favorite aviation bookstore, to find this one. I've also seen a really neat scale deHavilland Vampire and Venom that would make sweet slope scale machines. In general, the fighters of the '50s seem to make better slopers because of their somewhat more traditional design.

Travels and Such

In the not-too-distant future, I'm planning a trip around the U.S. to visit clubs, friends, contests, and other soaring- and sailplane-related venues. It will be a fun time to fly, to gab, to visit, and to meet many of you who write to me each month about what you've been doing in soaring. If the mood strikes you, drop me a line to let me know if you'd like a visit from "Soaring News," and I'll try to work it into the itinerary. Think of the info I can gather for the column first hand! See you all next month.

Jim Gray, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

M.A.R.C.S. National Sailplane Symposium Proceedings, Walt Seaborg, Editor, 1517 Forest Glen Rd., Oregon, WI 53575.

Scale Model Research, Bob Banka, 418-B E. Oceanfront, Newport Beach, CA 92661.■

FLOATING AROUND

(Continued from page 75)

structure and belly pan must be constructed as a separate unit to allow for conversion to land gear use, wherein the wheels will be mounted on the wing and a separate belly pan will then fill the gap beneath the wing. As a last test of Mike's ingenuity, the belly pan for the float setup had to develop enough strength to hold the struts in a section ⅜ inch thick at its thickest point.

To do this, Mike first constructed a jig for the aluminum gear, with a piece of cardboard serving as the belly pan. Next, Mike filled the tubular legs with glass cloth, and inserted ⅛-inch wire stiffeners one-third of the way down the tubes, and then glassed the belly pan. The resin was heated so that it ran down the legs and filled the cardboard forms for the strut foot pads.

After the initial setup had cured, Mike tied the wing to the fuselage and covered the underside with plastic wrap. He then mixed a batch of resin with a large proportion of microballoons, packed it into the belly pan, and pressed the belly pan/strut structure into the plane's underside. After curing, the now-conforming belly pan was pulled away and is shown in the photo prior to trimming. Due to the use of aluminum tube and handfuls of microballoons, the entire structure finished at 14 ounces. I'll come back to this project two columns down the road (river?), but I can already tell you it's a winner hands down.

Available Floats

To wind up this month, I'm including a list of floats available in kit or finished form. In deciding which one is for you, remember that the rule of thumb is: float length equals 80% of fuselage length and put the step under the CG. Next time I'll have the complete construction sequence for adapting a Goldberg Senior Falcon to floats. Until then, let's everybody go out and make waves!

Sureflight Floats: 28-inch long injection molded foam.

Top Flite Elder Floats: float kit for Elder 20.

Gee Bee Floats: 28- and 33-inch, of injection molded plastic.

(Continued on page 112)

FLOATING AROUND

(Continued from page 110)

B.J. Foam Floats: 3 sizes (32, 40, and 48 inches).

Tiger Models: Republic Seabee, Lake Buccaneer, PBY-5 Catalina.

Gee Bee Models: .25 size Mallard and .25 size Seahawk.

Sig Manufacturing: 48-inch built-up for the ¼-scale Cub.

Procter floats: kits for the Antic and Antic Bipe.

Hobby Shack Float kits: .19-.25 and .40-.45 with gear.

Balsa USA float kits: 2 sizes (30 inches/6 pounds and 45 inches/18 pounds).

Bridi Aircraft Designs: 27-inch built-up float kit.

Gresham Floats (707-998-3952): 26, 30, 33, 38, 45, and 48 inches foam.

John Sullivan, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

BYRON CORSAIR

(Continued from page 73)

to cut out and install the flaps with no problem at all. I used two servos for the flaps as the instructions indicated.

It was time to go back to work on the tailfeathers. The horizontal stabilizer consisted of foam cores sheeted with 1/16-inch balsa wood, a ¼-inch leading edge, plywood end caps, and a solid balsa tip. This is conventional construction and I had no problems with it.

The elevators are based upon gluing half ribs and spars to each side of a 1/16-inch sheet of balsa. Satellite City* Hot Stuff glue worked we" for that.

Rudder construction was similar to that of the elevators.

After completing the rudder and all wood parts, I installed the Purr Power mount and the Q50 engine as indicated in the instructions.

Installing the radio came next. I chose the Futaba* 7-channel. I used an Ace R/C* Atlas servo on the rudder and two servos on the elevator. I completed the radio installation as the plans indicated. The batteries I chose were two 1,200-mA with Ace's 2x5 redundant power source system.

When the radio and engine were in place, it was time to paint the Corsair. I used Cheveron* Perfect Paint, which gave the plane a glossy shine that needed to cure for a week before I applied the decals supplied in the kit. Once the paint and decals were in place, I sprayed the

(Continued on page 114)

BYRON CORSAIR

(Continued from page 112)

model with a protective coat of clear paint.

With the radio and engine in position, the Corsair weighed in at 22½ pounds.

FLYING. The moment of truth was at hand! The day I had scheduled for the Corsair's maiden flight turned out to be perfect. The sun shown warmly. With the spring starter on the engine she started right up. After a few minor adjustments there was no excuse to hold her back. I taxied her around for a few minutes and then pointed her into the wind. As I advanced the gas, the Q50 came to life and I realized at once that it supplied more than ample power. At about half throttle she broke ground and the beautiful Corsair climbed as steady as a rock. I retracted the landing gear and made a few passes to facilitate getting photos of the occasion. I then directed her to do loops, rolls, spins, inverted flight, and even four-point rolls! There seemed to be nothing this beauty couldn't do! The response on the controls was very positive and enjoyable to operate.

As you might remember, in constructing my Corsair I added flaps, but they really aren't necessary since the landing speed is not excessive.

This new member of the Byron family is a winner. The Corsair is a brand new "pretty baby" and construction is a "piece of cake." How sweet it is!

**The following are the addresses of the companies mentioned in this article:*

Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Robart, 310 N. 5th St., St. Charles, IL 60174.

Satellite City, P.O. Box 836, Simi, CA 93062.

Hobbypoxy, Pettit Paint Co., 36 Pine St., Rockaway, NJ 07866.

Ace R/C, Box 511C, Higginsville, MO 64037.

Quadra Engines, Trinden Mfg. Ltd., P.O. Box 544, Huron Park, Ontario, Canada N0M 1Y0.

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220.

Cheveron Hobby Products, P.O. Box 2480, Sandusky, OH 44870. ■

JHH F-86

(Continued from page 71)

and Pacer's* new Flex Zap cyanoacrylate for construction.

Although the building instructions and plans cover all phases of construction, I feel some additional comments are needed in some areas.

The F-86/FJ-3 is designed for use with retract landing gear. It's recommended that you use Rhom Air* belly mount nose gear and FAI mains. This is necessary because the higher profile of regular main retracts will not allow enough clearance for them to fit in the wing.

Before starting construction you must decide if you want to build this kit as an Air Force F-86 or a Navy FJ-3. The differences are subtle, but worth mentioning. The FJ-3 has a straight horizontal stab, a different shaped canopy frame, and longer nose gear that is set farther forward. Otherwise, things are pretty much the same and all changes are noted on the plans.

CONSTRUCTION. Begin construction with the wing. Normal foam core techniques are used with 1/16-inch balsa sheeting. The sheeting is actually very good balsa, not the usual factory outlet store stuff. When the landing gear mounting plates are installed in the cores, I like to drill 3/16-inch holes in the four corners all the way through the foam and then pin them with a wooden dowel. This seems to give them extra strength to help compensate for any rough landings.

When soldering the aileron cable linkage and pushrods, be sure to use a good grade of silver solder. Acid or rosin solders don't seem to work well in this high-stress, high-vibration area.

When cutting landing gear openings, pushrod holes, and spar slots in foam cores, transfer all markings from the plans to the cores using a felt-tip marker. Use a Dremel saw to cut those openings that go all the way through the cores, and a Dremel tool with a #196 cutter for recesses such as pushrod passages or the space where the landing gear block goes. Be sure to do *all* cutting before starting the wing sheeting. A little pre-planning in this area will save considerable work later on.

To glue leading edges, trailing edges, and tips in place, I use foam primer and slow cyanoacrylate in place of the epoxy suggested in the instruction booklet. This alone will save considerable weight.

The dorsal and stabilizer assemblies are made with a right and a left, or a top and a bottom half, with 2-ounce fiberglass cloth sandwiched between. I prefer to use 1/64-inch plywood in place of the cloth for two reasons: it makes sanding the airfoil shape on these assemblies a bit easier and it adds a certain degree of ding-proofing to the edges.

Be sure to get your elevator linkage working smoothly before permanently

gluing the stab in place, as it's very difficult to get to once this is done. When it's finally glued in, take a piece of 2-ounce fiberglass cloth and glue it in place with cyanoacrylate.

The elevator pushrod assembly is Y-shaped and about 4 inches long where it attaches to the control arms. To help prevent flexing in high G maneuvers, run a piece of ⅛x¼-inch spruce across the top and bottom of the pushrod glued to each side of the fuselage just ahead of the stab.

When you're working on the fuselage, you'll notice that all hatch lines, the canopy outline, and the stabilizer holes are etched into the fiberglass. This makes what would normally be a very difficult job very simple. To cut out the hatch, outline it with masking tape, then use a fine-cut X-Acto saw and remove the handle by prying it open with a screwdriver. You might wrap some masking tape around one end of the blade so it doesn't rip your fingers to shreads while you're using it. Starting at some point along the hatch outline and using the tape outline as a guide, drag the tip of the saw back and forth along the fiberglass until you cut through, giving you a pilot slot. Stop about ⅛-inch short of each corner to keep the piece you're sawing out from flopping around until you're finished. You'll have to do this four times in order to get the job done. Cutouts, like those where the plastic canopy and stab go, can be outlined with tape and cut out with a Dremel tool using a carbide bit. A regular bit will dull as quickly as a $2 pocket knife if it's used to cut fiberglass. Any touching up in this area can be done with a set of jeweler's files and sandpaper.

I might have jumped a step ahead of some of you because you might find it more desirable to install the fan mounts to the fuselage first before cutting out the hatch. This helps prevent warping or distortion, but you can do it either way.

Sand all areas inside the fuselage where gluing will take place with 80-grit sandpaper, then wash the area with some epoxy paint thinner on a rag. This will ensure that glued parts will stick to the fiberglass with maximum strength.

Glue with a mixture of 30-minute epoxy and microballoons. Add the microballoons to the glue until you get a thick pasty mixture. This makes the epoxy lighter and it seems to be a little less brittle than straight glue.

Where the fan mounts in the fuselage depends on whether you use the Turbax I or Turbax III fan units. The Turbax III fan sits ⅜-inch lower in the fuselage due

to the taller .65-size engine.

I've found that you can make first-class fillets with Sig* Epoxolite. This is a fantastic material that dries as hard as a rock but is feather light. Use a small metal 6-inch ruler with a rounded end to lay the Epoxolite in place. Let it set up for a few minutes, then dip your finger in water and smooth the fillet to shape. It isn't even necessary to sand them if they're properly done.

Finishing methods are left up to the builder, but it's best to cover all wood surfaces with ½- or ¾-ounce glass cloth and epoxy glue. This will make finishing easier and make the plane more durable. The finish on my F-86 is K&B* Superpoxy and all detailing is hand-painted; no decals!

I chose a very gaudy but colorful scheme from the Korean War known as "the Huff." This particular plane was flown by Lieutenant Jim Thompson in 1953, and had two MiG kills. All F-86s, while in active Air Force service, were polished aluminum all over with varying degrees of trim. Many were quite complex and colorful. Some of the Sabres were relegated to drone duty after serving their useful life. Most all of these were painted a Vietnam-type camouflage.

If you build the kit as the Navy FJ-3 Fury, the basic color scheme was gloss Sea Blue. In later life it was changed to gloss Gull Gray over flat Off White. Again, as on the F-86, the trim colors are varied and colorful.

There are two considerations when choosing a color scheme. First, silver is a very difficult color to paint. I did, however, stumble onto something very helpful if you plan to use it. I found that if you spray the first coat on using a satin catalyst, it will cover completely in one coat. You get the gloss by spraying on a final clear coat with a gloss catalyst. The second consideration is that silver is very difficult to see on a dark, cloudy day. How do I know? While landing on such a day, I ended up losing sight of the plane on final approach and the next thing I knew it was playing farmer and plowing up a soybean field about 25 yards short of the runway. Although the F-86 survived the incident with no damage at all, which speaks highly of its structural integrity, I was quite embarrassed.

Many years ago, a good friend of mine showed me a nifty way to paint insignia and trim on an airplane. Either draw a full-size copy of what you want or find a picture of what you want and run it through an enlarging copy machine until you get the size you need. Make several copies of each and turn them into stencils by cutting them out with an X-Acto knife. You'll need one stencil for each

JHH F-86

color to be painted. For instance, a star and bar will need three stencils. These are positioned in the proper location and held in place by painting the back of the stencil and where it goes on the plane with rubber cement. Rub the cement off of the area to be painted with your finger. Spray the appropriate color on and then peel the stencil off. Let it dry and then apply the stencil for each color until finished.

When setting up the retract system, be sure that the nose gear is long enough to cause the airplane to sit with positive incidence. Although the real F-86 sits in a nose-down attitude, *do not* set your model up this way unless you have the Edwards Air Force Base runway for your use. It will not want to rotate with negative incidence, due to the flat-bottom airfoil. You might find with the longer nose gear that it's necessary to cut out a recess behind the wheel well so the wheel will clear when retracted.

Jet Hangar offers a nifty option that is slicker than frozen pond water. It's a set of scale shock absorbing main gear that fit right in place on the Rhom Air retracts. These spring-loaded gear legs are machined from aluminum bar stock and the price is quite reasonable.

Make all final checks before getting ready to fly. Set the CG and control throws exactly per the plans. I'll go into this more later.

I'm using a Rossi .65 from Altech Marketing* for push in my F-86 and,

believe me, this engine is power personified. I'm talking Clydesdale horses. My engine is a rear intake drum valve with the marine piston and sleeve. When used with the Rossi nitro pipe and R-6 or R-7 glowplug, all you need is 5% nitro fuel for all the power you need. A good starting point for setting pipe length is 11 inches from the glowplug to the apex of the pipe.

I've heard reports of people turning their engines at 25,000 rpm static and then wondering why the rod lets go when it unloads in the air. Believe me, this is *not* necessary. Set the engine rich enough so that you leave a good visible exhaust trail while in the air. Even with the engine set below optimum, the JHH F-86's performance is second to none.

While I prepared for the first flight on my F-86, my mind wandered back to my previous two airplanes which had ended in crashes on their second flights. The crashes were caused by a succession of things; not just one problem. Due to this string of bad luck, Larry Wolfe and Bert Ayres gave me the name "Kenny Two Flights." I was hoping lightning wouldn't strike three times.

FLYING. I went to the flying field for the F-86's maiden voyage and conditions could not have been more perfect. The Rossi roared to life with minimum effort. You'll find that a little preparation before you go to the flying field can save you a lot of grief.

My initial taxi out was very slow in order to give me time to get more nervous. When I had advanced the throttle to begin the takeoff roll, I knew I had a tiger by the tail. I've never seen such acceleration from a ducted-fan model. Rotation was smooth and climb-out was very quick.

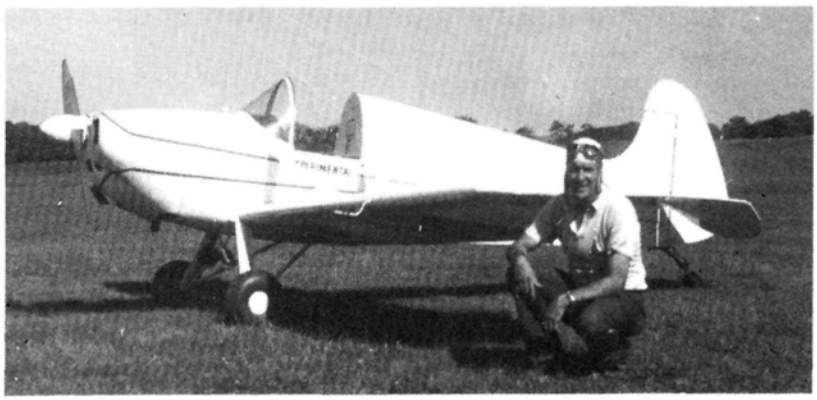
There is a saying among pilots that flying air combat is hour-upon-hour of boredom, followed by seconds of sheer stark terror. Let me tell you, the next 30 seconds of the flight were sheer terror. I didn't have to give aileron control, I just had to think it! I had set up the F-86 with about ⅝-inch aileron throw in each direction because that's the way I had done my previous planes. I like them very quick on the ailerons, but nothing like this. The plane almost struck the ground twice before I could calm it, and me, down enough to land it. After landing and gathering my nerves, I cut the aileron throw back to ¼ inch in each direction.

With each subsequent flight, the F-86 continued to get smoother. With the Turbax III, fan performance levels never before thought possible are now within reach of the average modeler. The plane will fly at impressive top speeds and perform four to five vertical rolls from level flight. Even with just ¼ inch of aileron throw, rolls can be as quick or as slow as you want. It will slow down to a walk for landings and flaps aren't needed. You have complete control throughout all speed ranges and it goes exactly where

NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to: **Model Airplane News,** Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.



Congratulations to Cliff Kell of Cincinnati, Ohio, for correctly identifying this group of modeling pioneers. Other correct entries were received from Sonny Palfini, George Ardwin, and Ralph Warner.

The photograph featured in our "Name the Plane" contest in the April 1986 issue was taken in 1961 at the Cincinnati Invitational sponsored by World Engines. Pictured left to right in the top row are Don Lowe, Walt Schroder, Sonny Schimpff, Dick Brantsner, Vern McNabb, Leon Shulman, Ralph Warner, Carl Goldberg, Beth Goldberg, Al Greer, Jack Josaitis, Frank Garcher, Bill Brown, Don Josaitis, Don Baldwin, and Weldon Smith. Kneeling left to right are Jim Northmore, Jack Port, Jim Mathis, George Poggen, J. Perry, Tom Dion, Corky Tenberg, Sid Axelrod, Ed Manulkin, and John Maloney.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

JHH F-86

you point it. Stalls are very mild and straightforward, with no tendency to fall off on either wing.

If you've been searching for a stand-off scale subject or a fun-fly aircraft that looks real, the Sabre is for you!

**The following are the addresses of the companies mentioned in this article:*

Jet Hangar Hobbies, 12554 Centralia Rd., Lakewood, CA 90715.

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008.

Rhom Products, 924 65th St., Brooklyn, NY 11219.

Sig Mfg. Co., Montezuma, IA 50171.

K&B Mfg., 12152 Woodruff Ave., Downey, CA 90241.

Altech Marketing, P.O. Box 286, Fords, NJ 08863. ■

FOUR-CYCLE

(Continued from page 88)

Germany in as little as four days, though the average is 8 to 10 days. As far as customs duty is concerned, I've also found the customs service to be quite lenient on one-time non-commercial entries. Often your order will just show up at your door, with no customs fee levied at all. If anything, you'll get a form from them through the mail. Once filled out and returned, your package will be delivered by the mail-person in the next couple of days.

Prices of the Lasers are, in British pounds: .61, £130; .75, £140; .90, £150; 1.2 V, £290; and the new .45 will be £120.

As for the use of the throttle stop, as Neil asks, I too like to kill my engines with trim override on the throttle, for which I disable the stop by backing the screw out and locking it in place. Modern-day radio systems are good enough to maintain the throttle setting at the required point for minimum idle, which is the preliminary requirement, whether it be done with a mechanical stop or with a servo. I must agree that a stalled servo in this application must be avoided at all costs; we'll never know how many good airplanes have been done in by such and no doubt blamed on "radio failure." You see, in a stalled condition, that is when working against a mechanical stoppage, the average servo will consume at least 500 milliamps of current from your nickel-cadmium pack. That's ½ amp! High-powered servos will consume even more current under these conditions. This will seriously reduce the available operating time and, long before you expect it, your battery is simply going to roll over and die.

It was simpler in the past when all

Club of the Month

JOINT MILITARY R/C FLYERS

In this month's issue we feature the Vought F4U Corsair in several ways, both in full-scale and in kit review. What better time, therefore, is there to award our "Club of the Month" prize to the Joint Military R/C Flyers Club of Oceanside, California? The club's flying field is on the U.S. Marine Corps Base, Camp Pendleton, which is an active military installation, and the members are quite lucky indeed to have not one, but two paved runways for their modeling efforts. Of course, because it's a Marine base, club members are part military and part civilian. The club dues are only $12 for adults and 50¢ for dependents up to age 16. Because of the great facility and the low dues, a substantial number of modelers are on a waiting list to join.

The president of the club is Frank Smith, who does his best to keep the club on a good standing with the base commanding officer.

The club was awarded the AMA Award of Excellence in recognition of their efforts in the community and specifically the Adopt-A-School Program, and Frank Smith and Marlin Kinning were awarded the AMA Superior Service Award for their efforts toward that end.

Model Airplane News applauds the Joint Military Flyers and is pleased to award this club two free annual subscriptions which are to be given by them to their outstanding junior members.

Congratulations!

Each month **M.A.N.** will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). **M.A.N.** will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletters to **Model Airplane News,** Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

FOUR-CYCLE

servos would buzz when stalled. Unfortunately, in this respect some of our present day equipment is so good that they no longer do this; they just sit there and eat the batteries. Check for this condition by observing the pushrod for flexing at both extremes of travel, and also for continued servo travel after the throttle arm has ceased to move.

Eloy Marez, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

A.G.C. Sales Ltd., London Rd., Apsley, Hemel, Hempstead, Herts, HP3 9ST, England. ■

Classified

RAZOR BLADES: single-edge industrial quality, super sharp. 100/$4.25, 200/$8.50, 300/$12.50, 500/$20.50, 1,000/$40.50; add 10% postage west of the Mississippi. Cobbie's Gifts, Box 2, Deal, NJ 07723; 201-922-9898.

1930-1950 model magazines for sale. Low price, $1.00 for list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

WANTED: RTF U-Control planes from Cox, Wen-Mac, Comet, Aurora, Testors, etc., complete or pieces, buy or trade. John Fietze, P.O. Box 593, Lynbrook, NY 11563.

MODEL AIRPLANE NEWS 1937 through 1952—$100. *Model Airplane News* in volume 1957, 1959, 1960, 1961, 1962, 1963, 1966, the 7 volumes for $80. Enrique A. Bandino, 549 Washington St., La Cumbre, Rio Piedras, Puerto Rico 00926.

POSTERS—P-51 MUSTANG PICTORIAL FACT-SHEET: 25x35 inches. Color $3.95. Complete list available. Mail Media, Inc., P.O. Box 8392M, Gainesville, FL 32605.

ANTIQUE MODEL IGNITION ENGINES—PARTS CATALOG, 40 pages, precision cast timers, original cylinders, point sets, drive washers, tanks, for O&R, GHQ, Bantams, Mortons, O.K., others. Large catalog $2.00 pp. Chris Rossbach, RD 1, Queensboro Manor, Gloversville, NY 12078.

FIREWORKS—Fun, Safe, Patriotic; top quality, lowest prices, illustrated catalog $1; (refundable), Pyro-Sonic Devices, Box 711MA6, Grand Haven, MI 49417.

HARDWARE AND SOCKET HEAD cap screws, all sizes, low prices. Write for complete list. Example 6-32x1" only $4.25 per hundred. Lane Distributing, P.O. Box 42A, Netcong, NJ 07857.

GET LONGER FLIGHTS SAFELY: Monitor your in-flight fuel supply. LCD countdown timers. Beeps when counter reaches zero. Mounts easily to transmitter. Two button time set—$14.95. Keyboard time set—$19.95. Add $1.95 for postage and handling. Modelcraft, Box 435, Grayslake, IL 60030.

CUSTOM EMBROIDERED EMBLEMS, CLOISONNE, ENAMELED PINS: Your design, low minimum, excellent quality, low prices. Free booklet. A.T. Patch Co., Dept. 135, Littleton, NH 03561; 603-444-3423.

WANTED: SUPER-TIGRE .56 R/C B.B. F.R. new or near-new. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

R/C SCALE PLANS: Stinson SR9, Curtiss P6E 1/6-scale $22.50, 1/4-scale $35.50. Catalog $1.00. Richard Barron, 11506 Ohio Ave., Youngtown, AZ 85363.

ANTIQUE ENGINE COLLECTORS: Very rare Ollison and Rice Twin. Only 26 built in 1943. SASE for pictures. Asking $1,750.00. Don Anderson, 1725 S.E. Cochran Dr., Gresham, OR 97030; 503-666-6712.

BOOKS—RAF ENTHUSIASTS: We recommend *Lancaster to Berlin* as must reading. Pocket edition $4.95. Other titles available, send $1.00. Mail Media, Inc., P.O. Box 8392M, Gainesville, FL 32605.

WANT TO BUY: Spark plugs 1/4x32 original production Champion V-2, V-3, or equivalent A-C, Autolite, etc. Any quantity. Woody Bartelt, 1301 W. Lafayette, Sturgis, MI 49091.

AERO CLUB OF ISRAEL needs your support for aeromodeling activities. Send SASE for Newsletter. Friends of the Aero Club of Israel, 147-02C 29th Ave., Flushing, NY 11354-1441.

BEGINNERS: Discouraged by too-fast R/C "trainers"? Send $1 for treatise rating over 20 well-known models for ease-of-flying. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

MOTORI CIPOLLA COMBAT: Cipolla-.36 ABC-(7 oz.) R.E.-$69.95, Cipolla 2.5 (15) Combat/FF AAC-SE-$59.95. Add $3 P&H. Motori Cipolla Combat, P.O. Box 111, Jasonville, IN 47438.

GIVE THE JOY OF FLIGHT: "Cerrito" is a miniature model sailplane that your youngster can easily build and consistently obtain substantial soaring flight! Quality kit includes everything for *two* planes, catapult, educational flight manual. $4.95 ppd. Interwood, Box 681-C, Port Townsend, WA 98368.

X-ACTO KNIVES, BLADES, tools, and stainless steel screws. Catalog $1. Refundable. Elwick, Dept. 591X, 230 Woods Lane, Somerdale, NJ 08083.

SMALL TENT MANUFACTURING BUSINESS FOR SALE: Mfg's shade canopies for modelers and sports. One of a kind. Patented. All tooling and equipment. See in June RC Modeler. 30K. 405-672-8847.

WANTED: DYNAJET Pulse Jet engines. Will pay cash for model pulse jet engines from the '60s and early '70s. Bruce Nagata, 5019 South Ward Way, Morrison, CO 80465.

OLYMPIC COLLECTORS NEWSLETTER sent free. Mike Nelson, Box 41630, Tucson, AZ 85717-1630.

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